EXCAVATING ENGINEER

FOUNDED 1905

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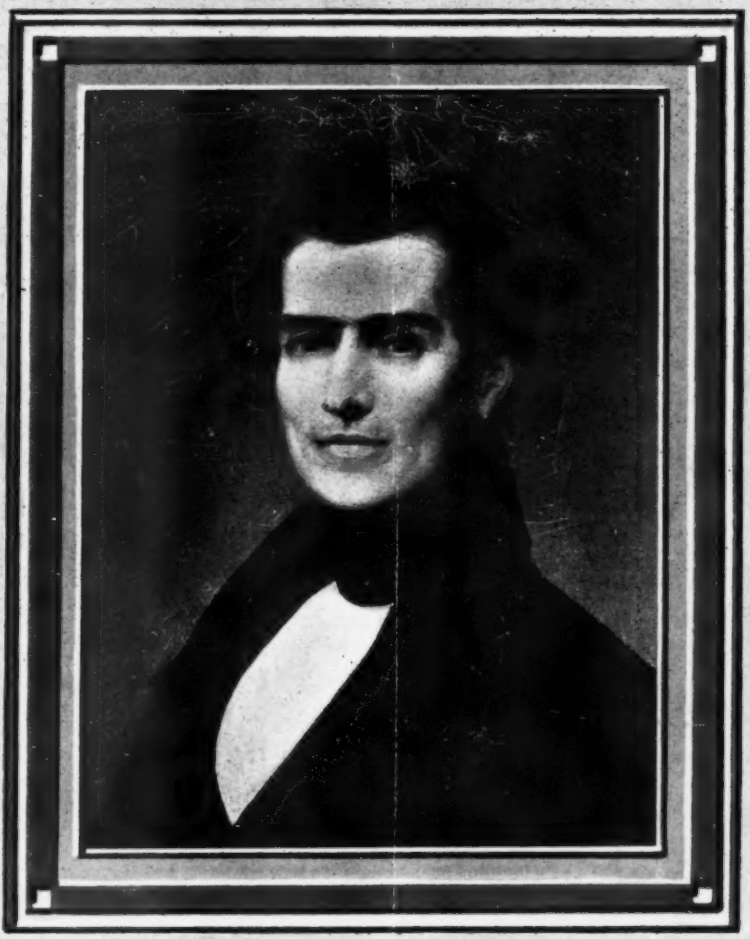


1813 — William S. Otis — 1839

Vol. XXX JUNE 1936 Number 6

This "Caterpillar" Diesel Tractor hauls big loads from a shovel for a few cents an hour on a coal-stripping operation in Penna.

THEY'LL TELL YOU WHY IT'S FIRST

Quick, easy starting—even in sub-zero weather when other equipment can't be moved . . . sure control and non-skid traction for sharp turns, steep pitches and soft, wet ground . . . no wonder the "Caterpillar" Diesel Tractor is first choice with drivers. Owners choose it for the remarkable cost records that back up its performance . . . earth moved at a few cents per yard . . . bulldozing, scraping, hauling at 60 to 80% reduction in fuel costs . . . maintenance costs at a record low level in spite of hard usage and 24-hour service. It's the power SHOW-DOWN—get the details from a dealer. Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

HARD FACTS ON THE SHOW-DOWN

Report from a Massachusetts highway job: "Our 'Caterpillar' Diesel Tractor hauls two 12-yard wagons on a 1200-ft. haul from borrow pit to fill. The average round trip is completed in 12½ minutes, in spite of a 20% grade for part of the trip."

Says a Pennsylvania owner: "Our first six 'Caterpillar' Diesel Tractors have worked more than 8500 hours each and are still setting records for low-cost operation."

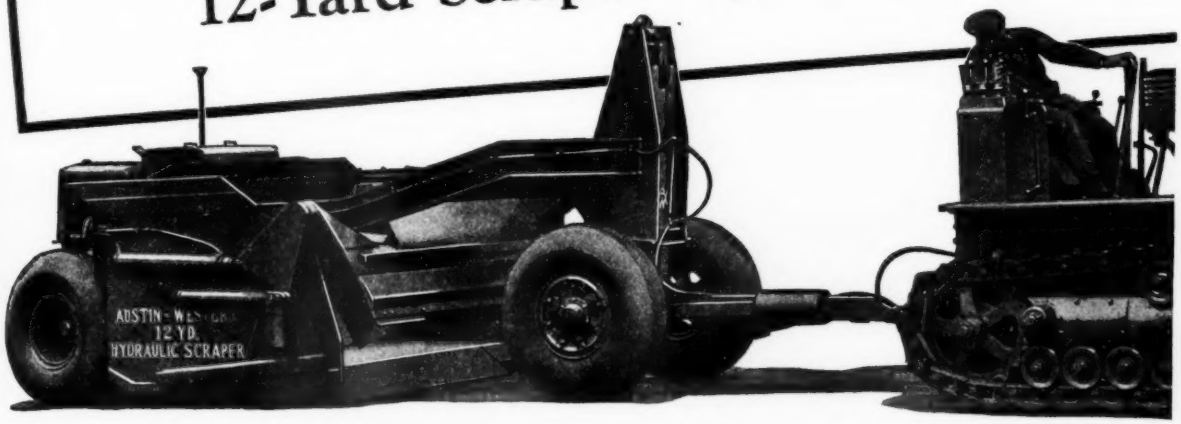
CATERPILLAR

REG. U. S. PAT. OFF.

Diesel

Now Available

Authentic Cost Records for Civil Engineers on Austin-Western 12-Yard Scraper Operations



● If you desire basic cost data on the Austin-Western 12-Yard Scraper, ask for these records. They should be of great value in checking costs on your earth moving projects.

Originally, these reports were gathered for Austin-Western's own engineering staff. They are prepared as engineers want them—terse, clear, concise—tabulated where possible. They will be sent free to any recognized engineer or contracting company.

The Austin-Western 12-yard Scraper is made for fast, continuous work under the most severe conditions. Special alloy steel increases capacity and lightens deadweight. Three-point suspension takes away strain from frame on rough ground. Extra high clearance for travel *over broken ground*. Open top permits loading with shovel or elevating grader where desired.

One man operates scraper easily. The powerful hydraulic controls are operated by remote magnetic control from the driver's seat of the tractor. Control connection between tractor and scraper is made in 20 seconds.

A separate motor powers the hydraulic mechanism. Thus no stalling of tractor or slowing down of operation. Power door-closing and power unloading.

●

Two Important and Essential Features on This Scraper

1. Separate power plant to power hydraulic controls. No slowing down or stalling tractor when scraper is dumped, giving far greater operating freedom.

2. Make or break connection of remote control of hydraulic system in 20 seconds. Simple as plugging in an electric light. Detach and use tractor for other purposes without delay or inconvenience.

●

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City..... State.....

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You can count on all-round high-speed performance for the 10-B . . . the kind that gives you big profitable output in any type of service. Sales records tell the story. The Bucyrus-Erie 10-B is the fastest selling ⅜-yard excavator on the market. Ask your Bucyrus-Erie representative why!

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For your convenience in writing to the Bucyrus-Erie Co., you will find a card bound in this issue.

PUBLISHED MONTHLY
FOUNDED IN 1905

EXCAVATING ENGINEER

FOUNDED 1905

DEVOTED EXCLUSIVELY
TO EXCAVATION

About Excavating Projects — By Excavating Men — For Excavating Men — The World Over

Vol. 30 **JUNE, 1936** **No. 6**

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Ahead of Schedule

Lewis-Chambers Construction Company averages 10,000 yards a day with the Chambers Bridge and Bucyrus-Monighan walking dragline, digging two of their four items on the Atlantic-Gulf Ship Canal.

Published Monthly by **THE EXCAVATING ENGINEER PUBLISHING COMPANY, South Milwaukee, Wisconsin, U.S.A.**

F. O. WYSE
Managing Editor

ARNOLD ANDREWS
Editor

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D. B. REED, JR.
Assistant Editor

E. M. HEUSTON
Advertising Manager

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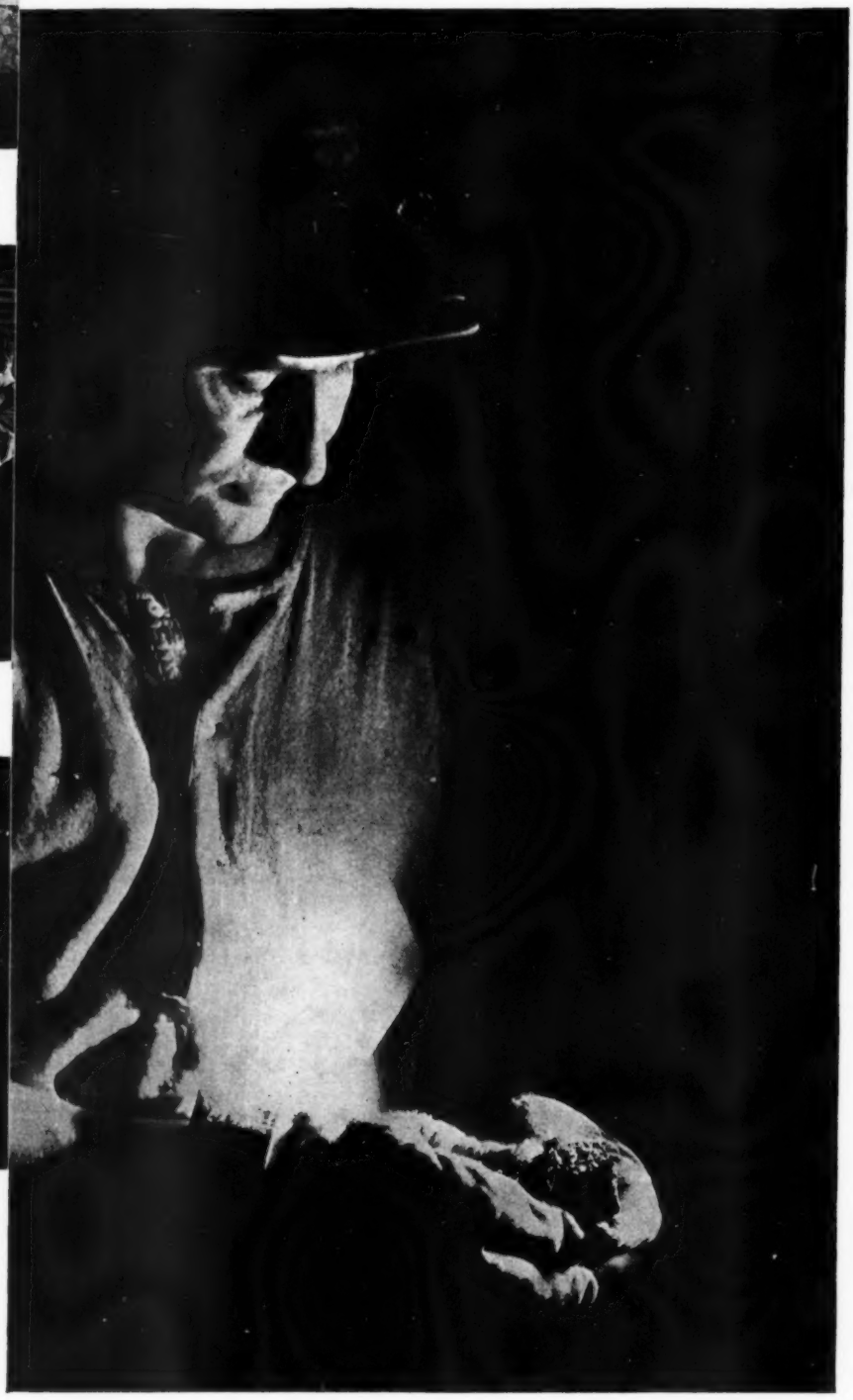
Always

They are getting ready to "tap" and these men are pouring a test specimen to help them determine the condition of the bath.

Steel made to physical specifications is tested for tensile strength in our inspection laboratory. It must be right!

Many times we are asked to develop steels to meet special specifications and to specify proper heat treatment. This is but another service rendered by our metallurgical department. Use this service any time.



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under Control . . .

from ore mine to finished product—every operation is carefully checked

OUR staff of observers from the metallurgical department are on the job every minute checking carbon tests, charge weights, slag conditions, state of oxidation, pouring temperatures, rolling temperatures, and all the various factors that are so necessary to the manufacture of good sound steel.

Nothing escapes their most careful scrutiny. For that matter, any of the melters, helpers, or other men are skilled workmen who have devoted years to the study and manufacture of steel. Notice the illustration—a first helper is examining a fractured test specimen which is only one of many guides used to control a "heat" of steel . . . of course the chemical and metallurgical laboratories check also.

It is this ability to control so many factors that enables us to serve you with so many different types of steel . . . or to make a steel to meet any special requirements. And in this day and age when so many products are being redesigned—when the demand is increasing for stronger steels and lighter construction—we have been able to meet all requirements.

Our metallurgical departments are ready to assist and advise you on any manufacturing problem that you may run up against.

AMERICAN SHEET & TIN PLATE COMPANY, *Pittsburgh* . . . AMERICAN STEEL & WIRE COMPANY, *Chicago and New York* . . . CARNEGIE-ILLINOIS STEEL CORPORATION, *Pittsburgh and Chicago* . . . COLUMBIA STEEL COMPANY, *San Francisco* . . . NATIONAL TUBE COMPANY, *Pittsburgh* . . . TENNESSEE COAL, IRON AND RAILROAD COMPANY, *Birmingham* . . . UNITED STATES STEEL PRODUCTS COMPANY, *New York, Export Distributors*

UNITED STATES STEEL

For your convenience in writing to United States Steel Corporation, Subsidiaries, you will find a card bound in this issue.

Not in the Contract

Smart Father: "Why don't you get out and find a job? When I was your age I was working for $3 a week in a store and at the end of five years I owned the store."

Not So Dumb Son: "You can't do that nowadays. They have cash registers."

"Say, did I see you grab my daughter by the foot?"

"Oh, no, sir! Far from it."

A visitor at an asylum was watching one of the inmates pushing a wheelbarrow up side down.

"That's not the way to push that thing," the visitor exclaimed, "you've got it upside down."

"O, have I," answered the lunatic, "I used to push it the other way, and they put bricks in it."

First Oiler: "Well Bill, what happened when you asked the boss for a raise?"

Second Oiler: "He was like a lamb."

First Oiler: "Yeah? what did he say?"

"Baa."

Two microbes sat on a pantry shelf,
And watched with expressions pained,
The milkmaid's stunts,
And they both said at once,
"Our relations are getting strained."

Contractor: "I had to fire my new stenographer."

Shovel Runner: "Didn't she have any experience?"

Contractor: "None at all. I told her to sit down and she looked around for a chair."

"Now, suppose," said the teacher, "a man working on the river bank suddenly fell in. He could not swim and was in danger of drowning. Picture the scene. The man's sudden fall, the cry for help. His wife knows his peril and hearing his screams, rushes immediately to the bank. Why does she rush to the bank?"

Little Johnny answered: "To draw his insurance money."

Joe: "I see where a young wife has presented her 85-year old husband with a baby boy."

Jim: "What do you think about it?"

Joe: "The same as you. . . ."

A kind old gentleman, seeing a small boy who was carrying a lot of newspapers, said:

"Don't all those papers make you tired, my boy?"

"Naw, I don't read 'em," replied the lad.

Teacher: "What insect requires the least nourishment?"

Peter: "The moth, for it eats holes."

Wife (angrily to her drunken husband): "I suppose you expect me to believe you came straight home from the office."

He: "Sure I did" (hic); "I came home just like the crow flies."

She: "So I see. Stopping frequently for a little corn."

An Irishman who had been in Alaska told the following story: "I landed me boat on an island. I went ashore and when I got up to about the middle of the island I met the biggest bear I ever see in me whole life. There was only one tree on the island and I made for that tree. The nearest limb was one about twenty feet from the ground and I jumped for it."

Somebody listening to the story said: "Did you make it?"

The Irishman replied: "I didn't make it going up, but I caught it coming down."

You Get An Independent Engine Cooling System with the Two-Stage Air-Cooled Portable

. SIZES .

60A, 105, 160, 210 and 315
(Actual capacity at 100-lbs. pressure)
Gasoline, Oil Engine, or Electric-Driven.

(The second of a series of five advertisements).

1. Air-Cooled Compressors
2. **Independent Cooling Systems**
3. "Constant Level" Lubrication
4. Open Type Clutch
5. Timken Bearings

. MOUNTINGS .

Units Less Running Gear,
Steel Wheels, Solid Rubber Tires,
Pneumatic Tires, I-R Trailer,
Two-Wheel Trailer,
Motor Truck Mounted.

The engine of a portable compressor to operate efficiently should be kept at a temperature of about 180° F., which means hot water in the jackets. Water at or near this temperature is too hot for efficient compressor cooling.

With the I-R Two-Stage Portable, water is used for cooling the engine and air for cooling the compressor, each of which performs its own duty correctly and represents the most efficient method for the purpose intended.

These independent cooling systems allow maximum operating efficiency of both the engine and compressor at all times.

A sectionalized engine radiator is used, having a removable guard and a radiator curtain. A dial thermometer in the radiator top tank indicates the engine cooling water temperature, and serves to guide the operator in positioning the curtain.

Write for catalog 3164 today.

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11 BROADWAY. NEW YORK, N. Y.

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30 YARDS AT A BITE!

Built by the Bucyrus-Erie Company for coal stripping operations.

with TIMKEN BEARINGS taking the LOAD

That is a really BIG shovel by any standard of measurement—a very Gargantua of a shovel. Each time the giant 30-yard dipper noses into the ground it scoops up 45 tons of dirt and rock—a good average load for a standard railroad gondola car.

The boom is 105 feet long and the dipper stick 64 feet long, giving the machine a cutting radius of 115 feet, a dumping radius of 106 feet and a dumping height of 70 feet.

32 electric motors furnish power for the various operations of moving, leveling, digging and dumping —all under the control of a single operator. All of these operations are carried out at a speed that is remarkable for a machine of this size and capacity. Naturally such a tremendous piece of equipment would seldom, if ever, be needed in construction work, but it is a splendid object lesson on the value of Timken Bearings.

Heavy duty Timkens are used in the main drive, swing machinery, crowd machinery and boom point sheaves, where their ability to eliminate friction and wear; to carry radial, thrust and combined loads; and to hold moving parts in correct and constant alignment is an important factor of efficient, dependable and economical operation. You need this ability in your equipment. Specify Timken Bearings.

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

TIMKEN *TAPERED ROLLER* BEARINGS

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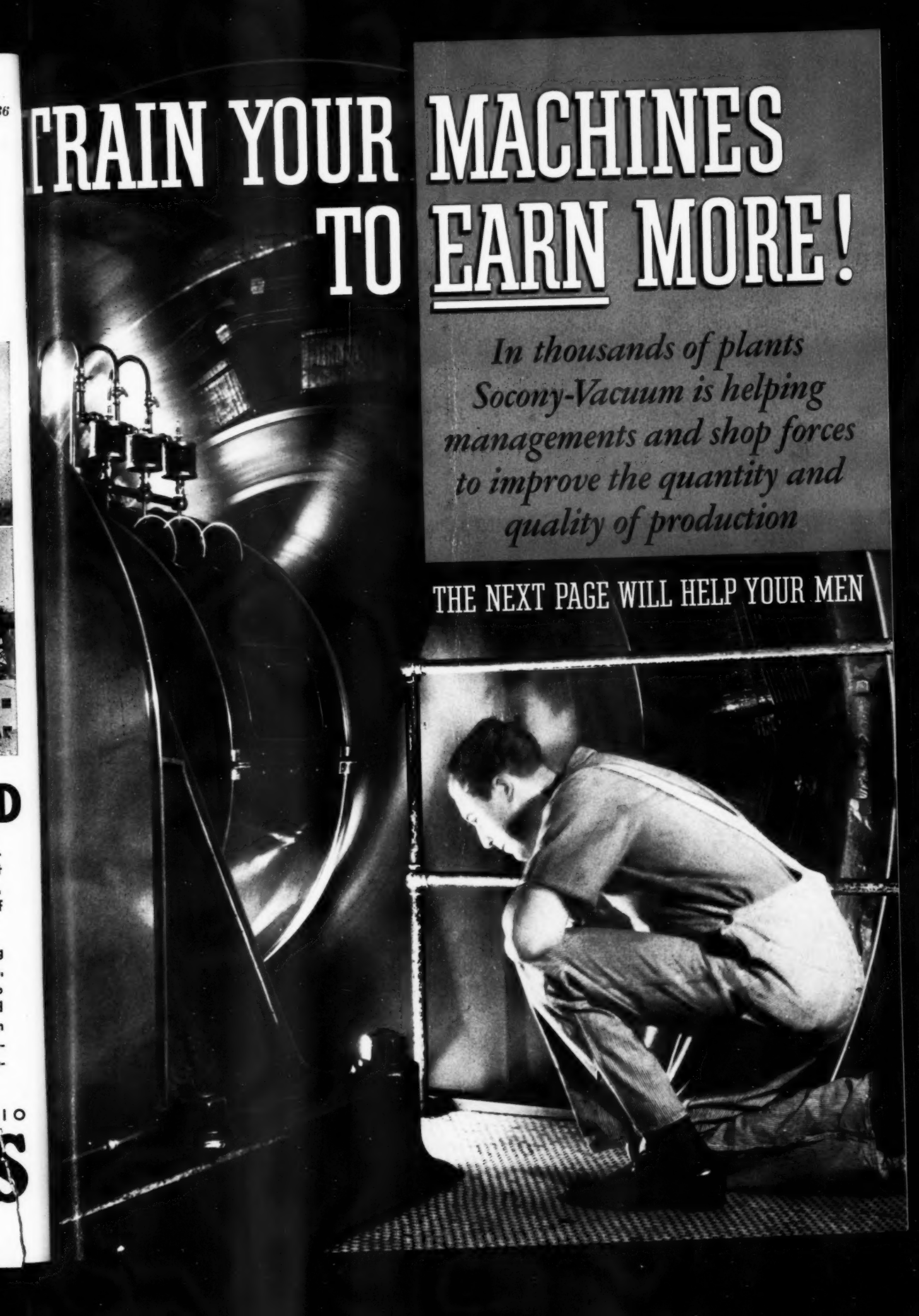
TRAIN YOUR MACHINES TO EARN MORE!
In thousands of plants Socony-Vacuum is helping managements and shop forces to improve the quantity and quality of production
THE NEXT PAGE WILL HELP YOUR MEN

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GARGOYLE LUBRICANTS "perk up" equipment, give it new life . . . make it work better, fas cheaper. That's being proved right now on some of biggest construction jobs in America.

Thousands of contractors find it profitable to m daily use of our lubrication experience. See Socony-Vacuum representative. He can help your n boost the earning power of your units.

GARGOYLE Lubricants

SOCONY-VACUUM OIL CO.
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The Koehring Wheel Dumptor
for hauling · dumping · spreading

Full vision for the Koehring Dumptor operator means fast loading, quick getaway, spot dumping and spreading. He has complete eye control of all operations from the driving position . . . the load is always ahead of the operator . . . for quick and easy spotting at the loading unit and instantaneous dumping . . . *seconds saved* in every operation by eliminating all unnecessary moves.

KOEHRING HEAVY DUTY

FULL VISION for SPEED

The load is instantaneously dumped by force of gravity, without time-losing mechanical complications.

KOEHRING COMPANY

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• *Above: Across the lagoon from the Field Museum and the Avenue of Flags. Speedway goes about the job of removing concrete from all buildings belonging to A Century of Progress. 100,000 yards of tough concrete were handled.*

• *Below: A 3-ton "skull-breaker" swung on a 60-foot boom broke down this all concrete gymnasium on the Jane Addams PWA Housing project in Chicago. Then the 3½-B shifted to shovel equipment and loaded the concrete to tracks.*

EXCAVATING ENGINEER

JUNE, 1936 VOLUME XXX NO. 6

Shoveling Concrete

Speedway handles over 200,000 yards of concrete removal with "skull-breakers" and 1½ yard shovel.

TO ANYONE remembering the colorful, angular panorama of Chicago's lakefront during A Century of Progress, the present appearance of that lakefront would come as a startling contrast. With one or two minor exceptions, all buildings are down, and the ground where they once stood graded smooth. Before long, the grass of a park will completely cover the bare spots which are the only indications now marking the sites where once stood the Hall of Science, the Skyride, the Travel and Transport Building, and half a hundred villages and concessions.

Dismantling and removing the buildings, and cleaning up was a tough job, severely taxing equipment and human ingenuity. The general contract for wrecking all buildings belonging to A Century of Progress, as well as for most of the privately owned structures, was awarded to Barker-Goldman-Lubin of Springfield, Illinois. They let a sub-contract to Speedway Excavating and Crane Service of Chicago for removal of all concrete.

Realizing that the job was unusually difficult, J. B. Kolko, Speedway president, and Henry Bussey, his engineer, studied the problems involved very carefully before bidding. Every building, being constructed differently, presented a different problem from the one next to it. It was decided that in order to do the job successfully in the time allowed, a power shovel would be needed. Shovels have been used in wrecking and concrete removal before, but Mr. Kolko decided he needed one more powerful and larger than the one-yard machines generally used. He got a Bucyrus-Erie 34-B with a special 1½-yard rock dipper and a Caterpillar Diesel engine. This shovel was moved in on the job in January, 1935, and handled over 100,000 yards of concrete in the nine or ten months that followed.

** Steel rods held the concrete used in the Sinclair Oil Company chimneys together even when those chimneys were taken down. When "strings" of blocks were too long for the shovel to handle, rods were cut with a blow torch.*

**Right: Service truck and trailer waiting to pick up tractor and bulldozer and take them through the city to the main plant as soon as a grading job is finished. Center and left: The 3½-B loading broken concrete to an Autocar 6-wheeler. Note the striking appearance of the equipment—excellent advertising for Speedway.*

Breaking Up Concrete Before Loading

The general method of procedure was as follows: Barker-Goldman-Lubin would remove all steel and other material from a build-

• *Cleaning up the second chimney at the Sinclair job. In the background is the last battery of the 3½ which must be removed under the contract. Picture shows, left to right: Hank Gralfin; Henry Hornung, Barker-Goldman-Lubin Superintendent; Henry Bussey; J. L. Kolko; Bill Gutzman; Marshall Kolko, young Speedway "general manager"; and Pete Hofstetter.*

ing, leaving only concrete superstructure and foundation. The former was then broken down by Speedway with 2 or 2½-ton skull-crackers operated on two Universal truck-mounted cranes. The concrete was loaded into trucks by the shovel. All material was the property of Barker-Goldman-Lubin, and was disposed as they directed.

With foundations the method was somewhat different. Here, concrete footings were usually anchored to piles of varying size and length. Where a foundation was anchored by clusters of three or fewer piles, the shovel would simply nose in under the slabs and "root" them off the piles, breaking them up into chunks that could be loaded as it did so. It was here that the extra power of the 34-B paid dividends according to its owner. Many foundations which ordinarily would have required dynamiting or breaking-up with the skull-crackers could be handled by the shovel alone, with consequent saving in time and cost.

Speedway Method Handles Tough Problems at a Saving

The toughest foundation encountered was that of the Travel and Transport Building. Concrete was in piers 30 feet square by 12 feet deep, with 30-foot piles and plenty of rods anchored in it. Some dynamiting was necessary, but the cranes swinging "frost-balls" did yeoman service in cracking slab so the shovel could keep the trucks moving regularly. Once the footings were loaded, the piles had to be broken off or cut off. This was handled by various methods; on the Travel and Transport Building most of the piling was "blown out" with dynamite.

The combination of skull-breaker and 1½-yard shovel, which Speedway first worked out for use on the Century of Progress job, is estimated to have saved 50 to 75 cents a yard over methods previously used on work of this type.

In many places a particularly troublesome, and even dangerous, problem was the presence, near the surface, of high voltage cable. The way "Pete" Hofstetter, who has operated the shovel since its purchase, avoided this cable, sometimes almost by instinct, was a great comfort to nervous by-standers and co-workers.

• *Henry Bussey-left-Speedway engineer, and tractor operator Hank Gralfin.*

The shovel was equipped with a Kohler lighting system and two floodlights for night work, but except for special hurry-up work, was operated only one eight-hour shift daily. Big dividends in the form of continuous, trouble-free operation under the tough conditions of the job were paid by Speedway's policy of keeping all equipment in tip-top shape. Every night the watchman cleaned and oiled the shovel. New cable was on hand for use the minute normal wear made replacement desirable. Commenting on the policy, Bill Gutzman, the oiler, said, "Clean? Hell, that shovel's kept so clean you could eat off it."

Maintenance System Keeps Equipment in Top Shape

While the shovel was kept on the job and given attention there, other equipment was taken regularly into the plant at 2811 So. Wabash where it was overhauled

• *Some of the Century of Progress buildings extended out over Lake Michigan. To root them up, the 34-B waded right out into the water — after "hanging its clothes on a hickory tree."*

and tuned up, because Speedway doesn't take any chances of watching profits slip by while equipment stands idle from break downs.

When the shovel was through at the exposition grounds and while this job was being graded off by tractors and bulldozers, shovel and cranes were moved over to Taylor and Sibley Streets to take down and remove an all-concrete gymnasium on the Jane Addams, PWA housing project. To break down the gym, the Bucyrus-Erie 34-B was rigged with a 65-foot boom, and swung a 3-ton "frost ball." This job was cleaned up in two or three weeks.

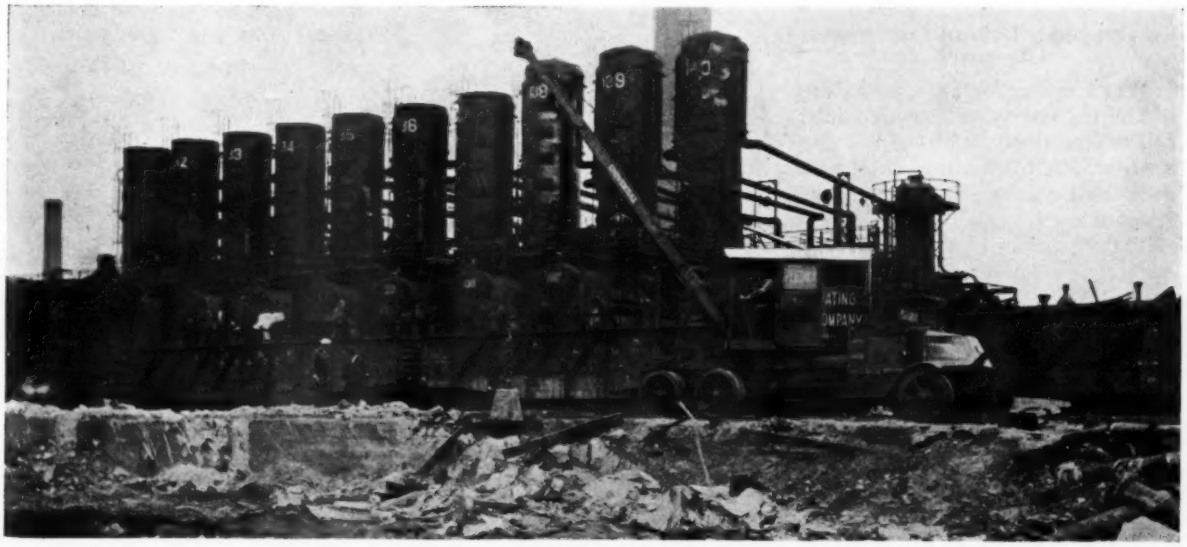
Other Speedway jobs during the period immediately following the lakefront job included wrecking the old Henrotin Hospital, removing concrete for the Edison Company and for new city fire stations. In all, thirty to forty thousand yards of concrete were handled on these jobs.

Novel Wrecking Job for Sinclair Oil Company

On January 11, 1936, Speedway moved in on a job involving removal of 75,000 yards of concrete for the Sinclair Oil Company in East Chicago, Indiana. A battery of 3½ old "stills" had to be taken down and removed. Again Barker-Goldman-Lubin are doing the steel removal. These "stills" are two "stories" high. On a concrete foundation sunk about 10 feet below ground, a battery of brick and concrete ovens rest. Above these, supported by concrete superstructures, runs a continuous steel coal hopper. When this, and all piping, has been removed, the cranes and dynamite are used to break down the superstructure. Concrete is then loaded into trucks and taken about three miles to Lake Michigan where it is dumped to make a 500-foot

• *Blow-torches are used to cut steel bracing rods so shovel can load the broken chimney concrete. Speedway has two truck-mounted compressors available for furnishing compressed air.*

• *One of Speedway's Universal cranes breaking down the concrete foundation wall of a "still" like the one shown in background. New batteries of ovens will be built on the ground being cleared by Speedway.*



WRECKING AND EXCAVATING
SPEEDWAY EXCAVATING AND CRANE SERVICE
CONCRETE BREAKING
Phone Calumet 5194 — 2811 South Wabash Ave. — CHICAGO

• *This attractive two-color multiple blotter, sent to customers, is an excellent reminder of the services Speedway has to offer.*

breakwater. Two reinforced cement and brick chimneys 165 feet high, have been removed, and one 260 footer has yet to be wrecked. Chimneys are taken down from the top by workers swinging sledges on outside scaffolds.

Exceptionally cold weather during January and February made the going stiff on this job, but the work went ahead every day. A portable office with steam heat and running water helped out by providing a place for the men to get "thawed out." Compressed air used in cutting steel rod reinforcements in the chimney material was furnished by one of Speedway's truck-mounted compressors.

As each still is removed, ground is graded so as to be ready for new construction.

The Sinclair job will be finished about the middle of June, and Speedway will move on to something else.

The Story Behind Concrete Removal

When asked for an explanation of the regularity with which jobs fall to Speedway, and the success with which they are carried out, Jack Kolko gave the following as reasons:

"This concrete removal is a specialized job and you have to have two things to handle it profitably: experience and the best of equipment."

As to experience — Speedway handles nearly 99 per cent of the concrete removal in and around Chicago, and have handled large yardage for many years. The entire organization knows how to handle it, knows the special tricks and problems that go to make an art of the business.

As to equipment—Speedway's speaks for itself. The largest and most up-to-date truck fleet in Chicago includes both large and small dump trucks, Fords, Macks, Studebakers, new 6-wheel Autocars, and special Mack Six-Wheelers with Boulder Dam-type rear axles. The new Autocars are equipped with special 12-yard bodies made by the Heil Company of Milwaukee for handling concrete. They are constructed with a wood cushion, or lining, to keep big chunks of rock from denting the steel body.

Speedway's 34-B is equipped for use as shovel, crane, clamshell, or dragline. The two Universal cranes on Mack bodies have 5/8 yard clamshell attachments, and use the various sized skull crackers.

A new Caterpillar RD-7 is equipped with an Athey Bulldozer, and is assisted in grading jobs by a Caterpillar Thirty with a La-Plant-Choate bulldozer.

A 160-foot Chicago Pneumatic Tool Company compressor mounted on GMC Truck, and a 120-foot compressor made by the same company and mounted on a Reo truck handle outside use of air hammers and blow torches.

A service truck with a 50 ton trailer moves the heavy equipment through the city rapidly from job to job.

The home shop is completely equipped with electric and acetyline welding outfits with power drills, etc., and most of the necessary repairs are handled here.

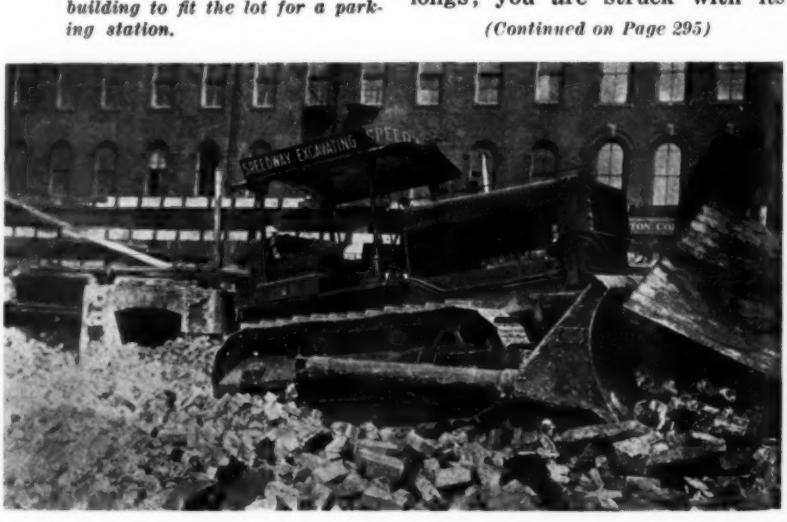
• *A Caterpillar RD-7 grading the last remnants of a wrecked building to fit the lot for a parking station.*

Appearance of Equipment Makes an Important Impression

In addition to its first-class mechanical condition, the appearance of the Speedway equipment suggests another reason why jobs come their way. It would be hard to imagine a better advertisement to back up a reputation for hard jobs well done than is presented by every unit of equipment. The Speedway color is bright red. All paint jobs are kept clean and renewed as soon as they begin to chip or grow dull. The name of the firm, its address and phone number are lettered on all units in gold in conspicuous places.

When you see Speedway equipment you know to whom it belongs; you are struck with its

(Continued on Page 295)



The Aqueduct Moves Along

J. F. Shea Company, of Los Angeles, complete one schedule and begin another

By **JOHN R. MARCY**

SCHEDULE 20 on the Colorado River Aqueduct, consisting of 18,560 feet, has just been completed by the J. F. Shea Company, Inc., of Los Angeles, and they are now in the process of moving their equipment to Schedule 18, which lies about twenty miles west of Indio.

This new schedule is 27,564 feet long, and is all cut and cover work. With the exception of 650 feet of siphons, conduit is to be used for the entire length. The contract price was $813,021 for the conduit, and $38,318 for the siphons.

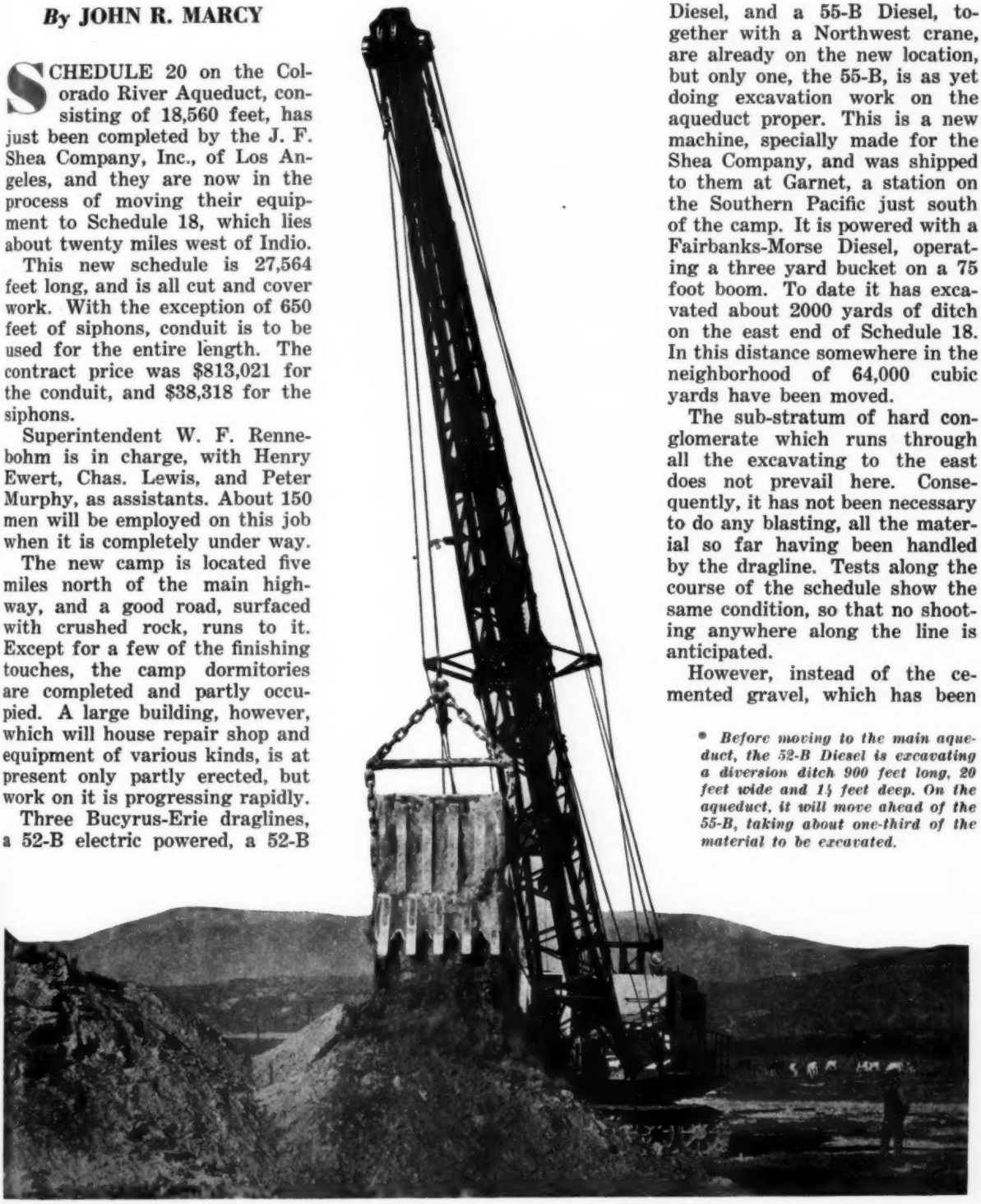
Superintendent W. F. Rennebohm is in charge, with Henry Ewert, Chas. Lewis, and Peter Murphy, as assistants. About 150 men will be employed on this job when it is completely under way.

The new camp is located five miles north of the main highway, and a good road, surfaced with crushed rock, runs to it. Except for a few of the finishing touches, the camp dormitories are completed and partly occupied. A large building, however, which will house repair shop and equipment of various kinds, is at present only partly erected, but work on it is progressing rapidly.

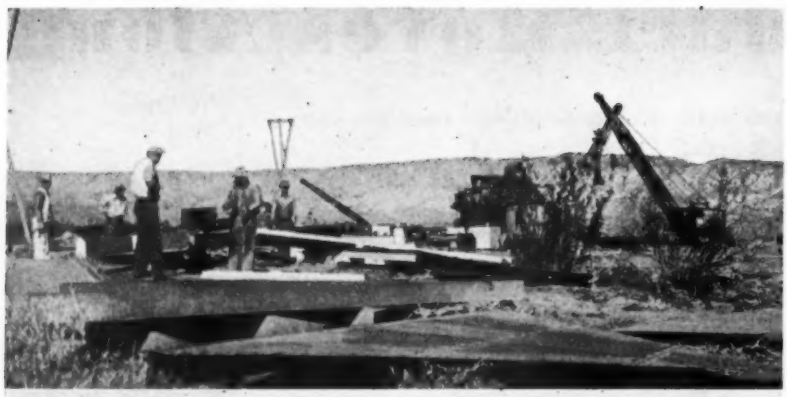
Three Bucyrus-Erie draglines, a 52-B electric powered, a 52-B Diesel, and a 55-B Diesel, together with a Northwest crane, are already on the new location, but only one, the 55-B, is as yet doing excavation work on the aqueduct proper. This is a new machine, specially made for the Shea Company, and was shipped to them at Garnet, a station on the Southern Pacific just south of the camp. It is powered with a Fairbanks-Morse Diesel, operating a three yard bucket on a 75 foot boom. To date it has excavated about 2000 yards of ditch on the east end of Schedule 18. In this distance somewhere in the neighborhood of 64,000 cubic yards have been moved.

The sub-stratum of hard conglomerate which runs through all the excavating to the east does not prevail here. Consequently, it has not been necessary to do any blasting, all the material so far having been handled by the dragline. Tests along the course of the schedule show the same condition, so that no shooting anywhere along the line is anticipated.

However, instead of the cemented gravel, which has been



• *Before moving to the main aqueduct, the 52-B Diesel is excavating a diversion ditch 900 feet long, 20 feet wide and 1½ feet deep. On the aqueduct, it will move ahead of the 55-B, taking about one-third of the material to be excavated.*



• *Above: Won't be long till this i. an operating aggregate plant. Th. 52-B electric and the Northwest ar. at the right, the 52-B Diesel in th. center back. Below: A Caterpillar 75 beginning the road over which concrete will be hauled from batcher to ditch.*

the bane of all the excavating to the east, the size of the boulders has increased here. These boulders are interspersed all through the gravel, and while not large enough to require shooting, are often of such size as to tax the capacity of the dipper and the ingenuity of the operator. It is here that the swing of the Bucyrus-Erie 55-B is especially effective. Operator A. B. Welton says that its flexibility and perfect response is the finest feature of the dragline. It is operating in two shifts at present, a day shift from 7:30 A.M. to 4:00 P.M. and a swing shift from 4:00 P.M. to 1:30 A.M., with two men on each shift, seven days a week.

About a mile due north of the camp runs the course of the aqueduct and at this point the batching plant is being located. Just now it is spread about over the ground in pieces, with only the crusher and screener partly in place. The disassembled parts of the plant are being transported to the site in Mack trucks.

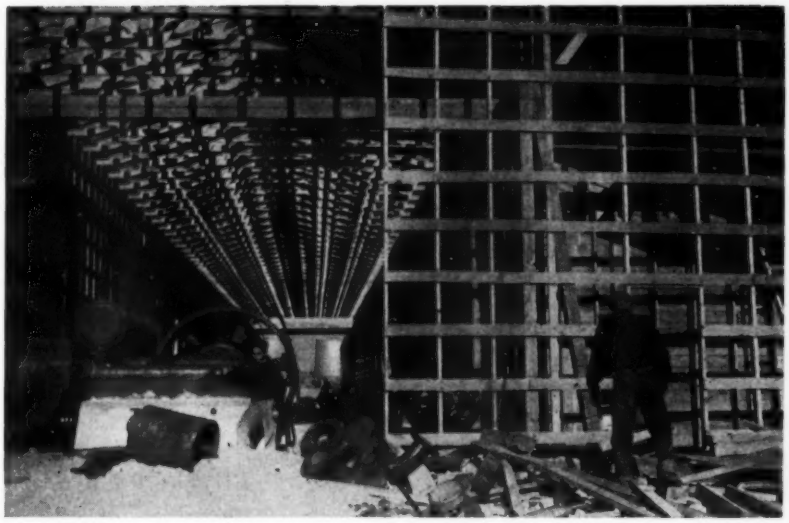
A Bucyrus-Erie 52-B lumbers about here like a friendly elephant. It is electrically powered, and instead of the bucket or dipper, a sling has been substituted. It is being used for handling parts in the work of assembling the batching plant. Later on, after this work has been completed, a dragline bucket will replace the sling and it will be used for loading the trucks at the aggregate pits. Power for it and for other uses comes from the Metropolitan Water District Power line, temporary supports at present leading the wires to the job.

The Northwest crane is also being used for the assembly work. Some of the material here, such as parts of the screening equipment, are so large or so bulky, that both machines are used in placing them. When assembled, the screening plant will be equipped with three Symons screens, each operated by a 10 h. p. Fairbanks Morse dustproof electric motor, and will have a capacity of 800 cubic yards per hour.

From the aggregate pits, which are about 100 yards away, the gravel will be hauled in trucks to a hopper. The type and kind of these trucks are yet to be selected, but the probabilities are that they will be Macks. They will be loaded by the electric 52-B, which will be permanently stationed at the pits.

The hopper is already in position in a pit which was excavated so that a ramp could be built. The trucks will drive up over this ramp and dump the gravel directly into the hopper. From here the gravel will be conveyed on a belt conveyor 100 feet to the crusher. After it is crushed and screened, another 100 foot conveyor will carry it down into a tunnel or pit through which runs a 30 inch belt conveyor that will take it up to the batching plant bins. This plant will have a capacity of 100 yards of concrete an hour. The mix is drawn off from storage bins 37 feet in height, in four-yard batches, all electrically regulated, and into Jaeger transit mixers. There are seven of these in all, mounted on Mack A B trucks.

• *Assembling the aggregate plant with the 52-B electric. J. F. Shea is getting all set to go after Schedule 18 in a hurry.*



• *The tool shed at the J. F. Shea camp, not yet finished. The Ingersoll-Rand compressor may be seen in the left foreground.*

Cement will be hauled from Garnet, on the Southern Pacific, in the Shea Company's own Mack AC trucks, and bucket elevators will convey it to the storage bins at the batching plant.

While the electric 52-B Bucyrus-Erie and the Northwest crane are busy with assembly work, and the 55-B Bucyrus-Erie is digging the aqueduct ditch proper, the other 52-B Diesel powered Bucyrus-Erie is engaged in excavating a diversion ditch. A dry creek—dry except in wet weather—intersects the aqueduct, and its course is being altered so that it will join another nearby wash. This entails a good-sized ditch, but is just an incident on a job of this magnitude. A two man crew working one eight hour shift from 7:30 to 4:00 is now operating this machine six days a week.

As soon as this ditch is completed, the 52-B will take its place on the aqueduct. Here it will make a V shaped excavation, removing about a third of the material. The 55-B will follow it and remove the remainder. The cut is 34 feet wide at the bottom with a 1½ to 1 slope.

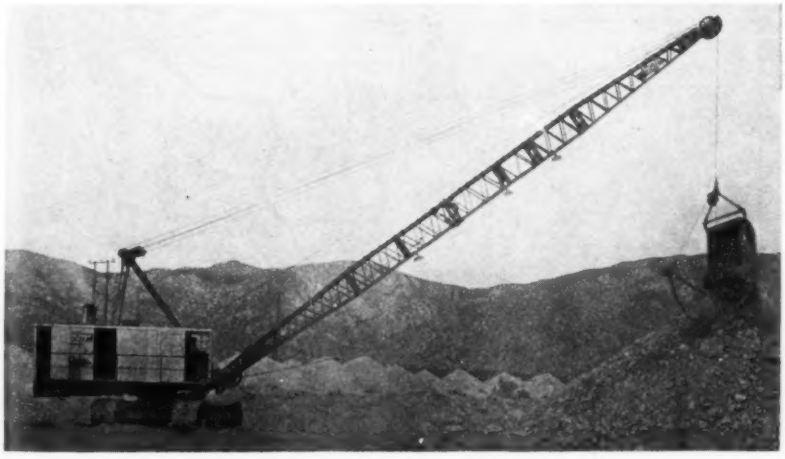
All the dirt will be removed from the cut with the draglines.

At the same time another necessary preliminary is going steadily forward. This is the construction of a road from the batching plant to a point on the aqueduct about a mile away. Concrete will be hauled over it to the gantrys, and as they move along, the road will be extended down along the line of the aqueduct.

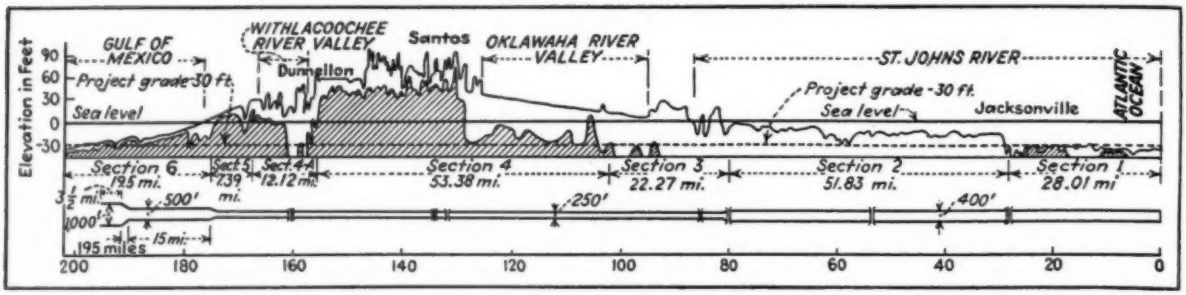
• *This hopper, into which trucks will dump aggregate, is only partly in position in the pit. A ramp will be built over it later. A conveyor section is projecting toward the screening plant.*

The desert floor here is fairly level, and as it consists of loose gravel it is a natural roadbed. Grading is therefore the principal job, and this is being done with a 75 Caterpillar and bulldozer. After the grading is completed the road will be surfaced with fine gravel from the screening plant. Good roads are a feature everywhere along the aqueduct, even the minor ones such as this being as smooth and as wide as a state highway. The nature of the country and the abundance of material make this possible. They are always kept in the best of condition by frequent scraping. All the main roads, of course, are of concrete, hundreds of miles of them stretching between all the important points along the aqueduct.

At the camp repair shop only the Ingersoll-Rand compressor is in place. This machine has a capacity of 1100 cubic feet. Later on a forge, lathe, drill press, bolt machine, and other usual field shop equipment necessary for minor repairs will be installed.



• *The only machine as yet excavating on the aqueduct proper is this 55-B Diesel dragline. It was made specially for the J. F. Shea Company, and carries a 3-yard dipper on a 75-foot boom.*



• *Cross-section of the peninsula of Florida in the region of the canal. Drawing courtesy of Engineering News-Record.*

Draglines Dig Atlantic - Gulf Ship Canal

Brooks-Callaway ahead of schedule on items 27 and 28

By L. H. Houck

WHAT will happen to the $143,000,000 ship canal in Florida when the present contracts expire in July is very much of a question. After its recent investigation of the project, Congress refused to appropriate additional funds; the President has said that no regular relief funds would be allocated to it, and that future money would have to come through Congress.

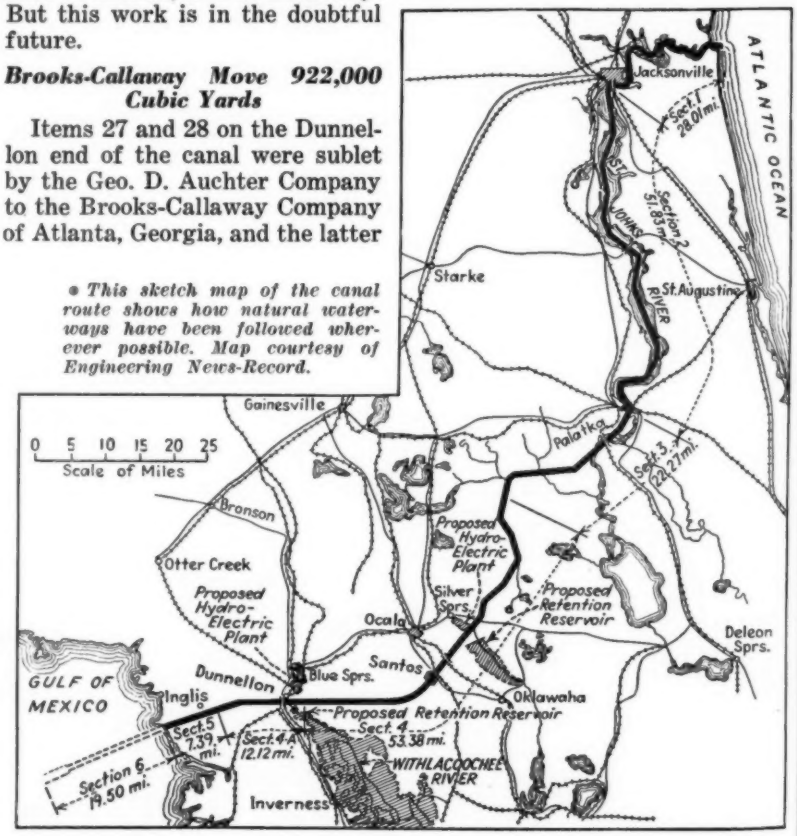
But whatever the future may bring, the eight contractors who were awarded contracts amounting to $2,915,180 for about 13,500,000 yards of excavation are forging steadily ahead, handling over 85,000 yards a day along a 95-mile front of dry digging. The dirt moving, under the special contracts calling for providing one man-year of employment for each $1,000 of the contract, raises special problems of method which will be described in this, and following, stories of the actual excavation work on the canal.

So much has been printed about the general aspects of the project that no comprehensive summary will be attempted here. The accompanying maps will serve to give sufficient idea of the geography of the canal. The somewhat devious route was selected in order to take advantage of the existing waterways, which will cut the length of dry-land excavation to 95 miles, total length of the canal being 190 miles. To secure the required dimensions — 200 foot bottom width, and 30 to 41 foot depth—considerable dredging of the St. Johns, Oklawaka and Withlacoochee rivers, and a 19-mile section extending into the Gulf of Mexico, will be necessary. But this work is in the doubtful future.

Brooks-Callaway Move 922,000 Cubic Yards

Items 27 and 28 on the Dunnellon end of the canal were sublet by the Geo. D. Auchter Company to the Brooks-Callaway Company of Atlanta, Georgia, and the latter company is about two months ahead of schedule on these two items. The total yardage of their contract is 922,000 for the two items. Item 27 contains 380,000 yards let at 24.8 cents and Item 28 amounts to 542,000 yards and the contract was let at 21.9 cents.

Brooks - Callaway moved in three draglines and other equipment. The largest dragline, and



• *This sketch map of the canal route shows how natural waterways have been followed wherever possible. Map courtesy of Engineering News-Record.*

• *The 150-foot boom on the Bucyrus-Erie dragline makes it possible to dig on the center line of the canal and dump direct to the spoil pit.*

the one being used for the bulk of the heavy work, is a 230 B-E outfit, Diesel powered and caterpillar mounted. The machine is fitted with a 150-foot boom, and both six-yard and eight-yard buckets are used. There is no rest for man or machine on this job until Sunday — the entire equipment works 24 hours daily in 8-hour shifts, with a Kohler system providing light for night work. Each Sunday for 24 hours work is stopped. The inspectors measuring the hole the 230 B-E digs every 24 hours enter in the log-book that 6,000 yards of material has been handled.

Other draglines in use by this company are a Bucyrus-Erie 45-B, a two-yard machine, and a small Northwest. The small machines are used principally for rehandling jobs and miscellaneous work.

This big machine which has put the Brooks-Callaway Company months ahead of schedule is powered with two Atlas-Imperial Diesel engines, rated at 200 h.p. each. These power plants turn two 120 kilowatt generators, which are direct connected to 450 to 500 r.p.m. engine shafts. The current from the generators turns the main motor, a 250 h.p. Westinghouse and a 75 h.p. swing motor, besides a varied assortment of fan, water pump and auxiliary motors, ranging from 16 h.p. down.

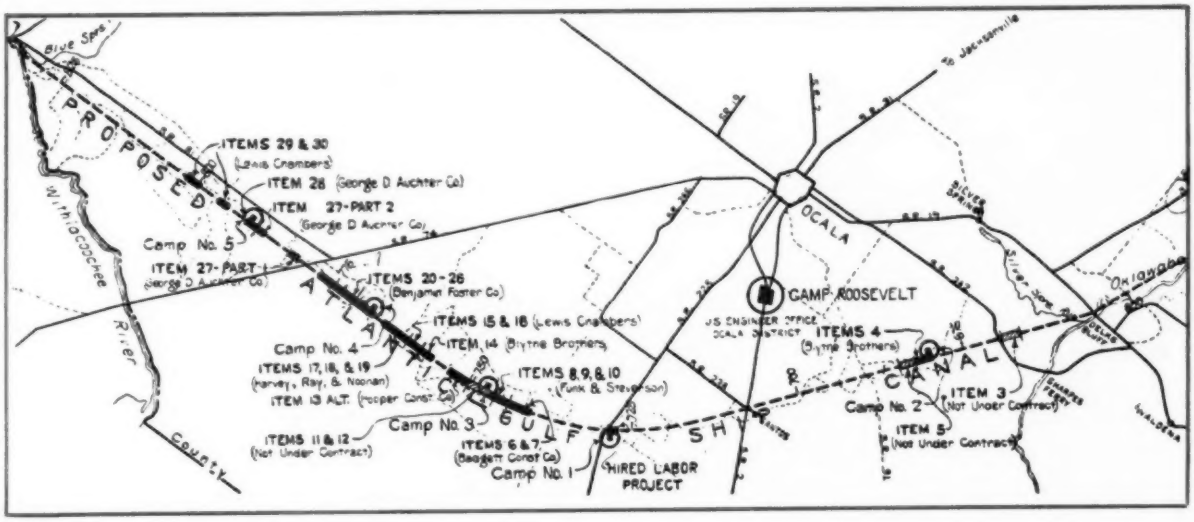
• *Because government labor regulations are such as make it necessary to load trucks by hand, Brooks-Callaway's 45-B swinging a 2-yard bucket on a 45-foot boom, is used mainly for rehandling and finishing.*

The motor generator set and motors are by Westinghouse and the control system is Cutler-Hammer.

The Diesel engines are using an average of 500 gallons of fuel, 32-27 fuel oil, each 24 hours against a daily average output of 6,000 cubic yards of dirt.

Depending on the type of digging, the machine is being used with an eight-yard or a six-yard bucket. With the 150 foot boom,

• *Principal items of construction, with the exception of the George D. Auchter items farther east, are shown on this map. Brooks-Callaway sublet Items 27 and 28 from the Auchter Company.*


PROPOSED
ATLANTIC
GULF
CANAL
ITEMS 29 & 30 (Lewis Chambers)
ITEM 28 (George D Auchter Co)
ITEM 27-PART 2 (George D Auchter Co)
Camp No. 5
ITEM 27-PART 1 (George D Auchter Co)
ITEMS 20-26 (Benjamin Foster Co)
ITEMS 15 & 16 (Lewis Chambers)
ITEM 14 (Blythe Brothers)
Camp No. 4
ITEMS 17, 18, & 19 (Harvey, Ray, & Noonan)
ITEM 13 ALT. (Hooper Const Co)
ITEMS 8, 9, & 10 (Funk & Stevenson)
Camp No. 3
ITEMS 11 & 12 (Not Under Contract)
ITEMS 6 & 7 (Baggett Const Co)
Camp No. 1
HIRED LABOR PROJECT
OCALA
CAMP ROOSEVELT
U.S. ENGINEER OFFICE OCALA DISTRICT
ITEMS 4 (Blythe Brothers)
Camp No. 2
ITEM 3 (Not Under Contract)
ITEM 5 (Not Under Contract)
Withlacoochee River
County
Silver Springs
Ocklawaha River
To Jacksonville

• Top: Flat wood dump bodies built on the job, are mounted on Ford V-8 trucks. These are loaded by hand by the labor recruited from Florida relief rolls. Bottom: The log "ties" on which the 230B travels are picked up behind the machine, loaded on trucks, and re-laid ahead of the dragline.

working down the center of the main canal, the dragline pitches excavated material directly to the spoils banks.

The 230, mounted on a set of cats at each corner, is tracked ahead on a pole road laid down ahead of the machine. The ground is scraped into shape for the logs by a Caterpillar-driven bulldozer. The logs are picked up in the rear of the machine, loaded on trucks and dumped in front. As the machine eats its way along, the logs support the 500 tons with little difficulty.

The 45-B, which under ordinary conditions would be used to load wagons and crawlers, is mainly used for rehandling, since the terms of the government contract in regard to relief labor are such that wagons are loaded by hand. This dragline is equipped with a two-yard bucket and B-E aluminum alloy boom 70 feet long. It is Diesel powered and Caterpillar mounted.

The other dragline used by Brooks-Callaway is a small Northwest, which is equipped with a fabricated steel boom 45 feet long and a two-yard bucket. At the beginning of the work they used the machine for a short time to load crawlers until the relief labor had been recruited to the maximum, when it was put on clean-up and reworking the sides.

Trucks Loaded by Hand Labor

Because of the relation of man-hours to machine as required by the government, it was found to be more efficient to keep the labor at work loading trucks and crawlers and consequently out of the way of the large equipment moving immense quantities of dirt.

• Above: A close-up shows the log tracking on which the 500-ton dragline moves over the soft ground. Moving the "tracks" is one of the jobs on which the required hand labor is used. Left: Some of the men in charge. Left to right: I. W. Shumaker, superintendent for Geo. D. Auchter; B. E. Brooks, president, Brooks-Callaway; H. M. Dunn, chief U. S. Inspector; J. H. Ringeling, assistant U. S. Inspector.

Other equipment in use by the Brooks - Callaway Company, to take full advantage of conditions, includes ten 1½-ton dump trucks, nine of which are Ford V-8's. These trucks are equipped with a flat board dumping platform for gravity dumping, made on the job by local labor. Truck drivers come from relief rolls and are paid a minimum of 45 cents per hour. Laborers who load trucks with pick and shovel get a minimum of 30 cents per hour.

Five crawler type wagons with a capacity of 12 yards each are filled by hand labor. These wagons are spotted and dumped by four Diesel 75 Caterpillar tractors. Drivers for these machines also come from the relief rolls and receive a minimum of 55 cents an hour.

(Continued on page 320)

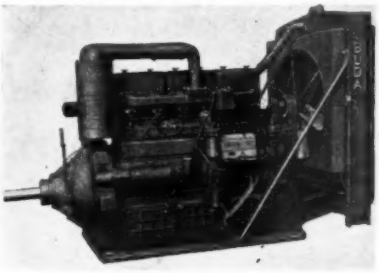
EQUIPMENT
You Ought to Know About

Diesel Power Unit

THE Buda-Lanova Diesel engine, recently announced, has an unusual type of cylinder head which is claimed to result in "soft combustion," attained through increased turbulence and controlled combustion.

In the Buda-Lanova Diesel, the rate of pressure rise is well within the limits of gasoline engine practice; maximum pressures are not over 625 lbs. per sq. in. The compression ratio is also comparable to that of a gasoline engine, according to the manufacturer, being 12.5 to 1 and 13.2 to 1. The unusual and controlled turbulence develops a high workable mean effective pressure, which, in most Diesels, can be obtained only by high combustion pressure.

The crankshaft is 3½ in. in diameter, is dynamically and statically balanced, has seven steel-backed main bearings, which are of the precision type. The combined length of the main bearings is 18⅛ in., giving the crankshaft an unusual "riding surface." Connecting rods are 14¼ in. from center to center. Lubrication is force-feed to all main, connecting rod and camshaft bearings. Connecting rods are rifle drilled for positive lubrication.



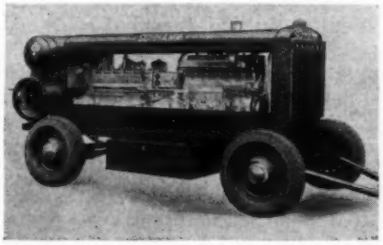
Further information can be secured by writing to the Buda Company, Harvey, Illinois.

Schramm Announces New Diesel Compressor

A NEW line of portable compressors was recently announced by Schramm, Inc., West Chester, Pa.

The design of these "Utility" compressors establishes a new precedent by operating through direct drive from either gasoline or Diesel engine at approximately 1200 R. P. M. The compressor unit is six cylinder, of small bore and stroke and light weight reciprocating parts. Because of the light weight castings which can be used for this design the manufacturer claims a saving in weight of 50% or more over former types of portable compressors.

Another feature of design is mechanical intake valve action. This valve action assures perfect timing of air entering pistons and at the same time allows full area of compressor head to be devoted



to discharge valve which is said to out-perform any other valve sixteen to one because of the larger valve area used and the reduced amount of valve action per square inch.

These compressors are built in four sizes with actual air deliveries of 105, 210, 315 and 420 cu. ft. free air per minute at 100 lbs. pressure. They are offered in a complete assortment of portable running gears. They can be secured with Buda Gasoline or the latest type "Lanova" Diesel engine. The manufacturer has prepared new printed matter covering these types which can be secured by writing Schramm, Inc., West Chester, Pa., and requesting bulletins No. 3605 and 3607.

New Duplex Hose

A TYPE of rubber tubing, or hose, of radically new construction has just been placed on the market. It is especially designed for welding equipment and similar services. Twin hose are simultaneously molded with a connecting web between them, so that a cross-section resembles the figure 8. A single length of this non-kinking hose is all that is necessary for equipment which heretofore has required two separate lengths, it is claimed. The hose is of Supero construction, with a special cord-wound reinforcement between the first and second

braid, giving it a higher burst limit than ordinary welding tubing. With the ¼-in. size the burst is 2,000 pounds. Supero construction permits the use of differing pressures in each side without torque or writhing.

"Supero Siameez" is the tradename adopted for this hose by the manufacturers, Electric Hose & Rubber Co., Wilmington, Delaware. Supero Siameez hose is made with individual hose in different colors—red and black or red and green, for example, or with both hose lines the same color.

Portable Drag-Scraper Announced

THE Sauerman Scraper-Loader, a crawler-mounted drag scraper machine, completely portable under its own power, is announced by Sauerman Bros., Inc., 474 So. Clinton St., Chicago.

This new machine combines the long range capacity of the drag scraper with the direct loading action of other types of mechanical loaders. It is suited to any work that requires moving materials from a pit, bank or stockpile and loading the materials into trucks or other form of transport, according to the manufacturer.

One man operates the machine and he has just four simple levers to handle; two of these levers con-

(Continued on page 319)

EXCAVATING ENGINEER

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The Business Situation

WITH a number of adverse influences striking severely at business confidence, industrial activity has continued to climb steadily with the advancing spring. Political uncertainty, heavy taxes, unbalanced budget, labor unrest, floods, threatening drought in the Southwest, the financial crisis in France, war clouds over Europe, Russo-Jap friction in the Far East . . . nothing seems to stop for long the steady advance of the indexes that tell the story of American business recovery. Babson, on his composite business chart, shows recovery at 12.6 per cent below his base for normal. He reports steel at 69.4 per cent of capacity; auto, lumber, and electric power sales steadily increasing, only car loadings showing a tendency to lag. Cleveland Trust reports autos the most important factor in recovery. Of their "three fundamentals" autos have reached 85% of 1929 volume, iron and steel output is at 75% of 1929, while construction trails along at 40% of 1929.

Says Cleveland Trust regarding this most important of industries to readers of Excavating Engineer:

"The laggard recovery of construction constitutes the least favorable factor both in the present status of general business activity and in the prospects for further improvement. Increases in residence building have been large when measured from the low levels of three years ago, but the total volume is still relatively low. Commercial and industrial construction, and especially construction by the public utilities, continue to be greatly restricted. If we could have a large-scale resumption of construction confidently carried forward by business enterprise, the total volume of industrial output would sharply increase, the difficulties of our railroads would be greatly lessened, the number of workers in our service occupations as well as in industry would rapidly advance, and many of the problems of unemployment would be solved."

While car loadings are not advancing as rapidly as some other indicators of business conditions, there has been a steady increase for the past six weeks. According to Railway Outlook the gain for the first 18 weeks of 1936 over last year, totals 747,264 cars. Railway gross operating revenues went up almost 180 million dollars in the first three months, railway employment is up 7.4% from a year ago.

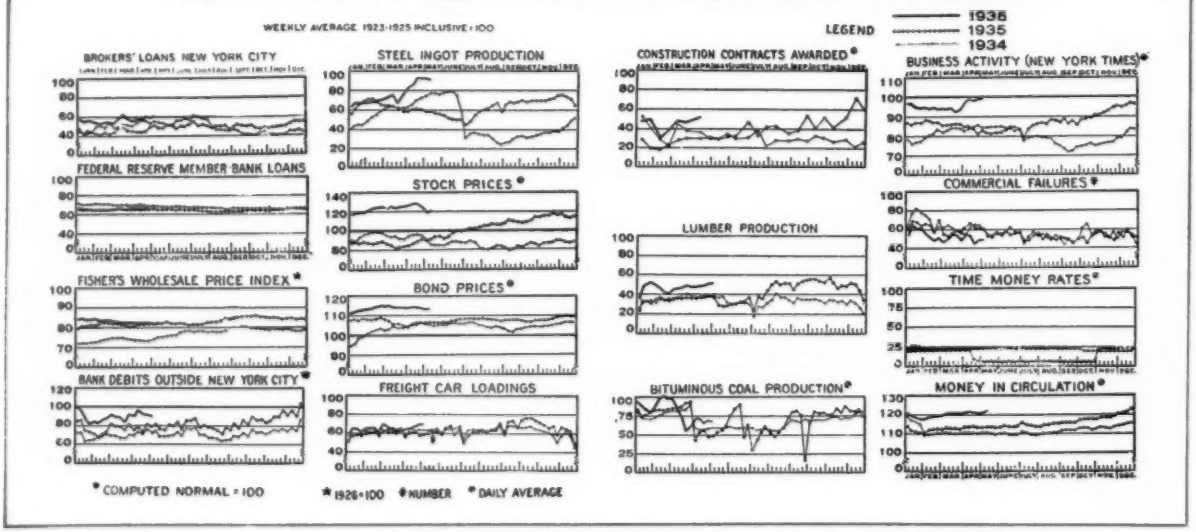
In discussing the farm situation the National City Bank says:

"An important factor in the business gains is the rise of farm buying power over a year ago . . . this indicates that the improvement is in considerable measure independent of subsidy. According to the Department of Agriculture, farmers' cash income in March was $528,000,000, including $15,000,000 in benefit payments, compared with $479,000,000, including $50,000,000 benefit payments, in March last year. During April benefit payments increased sharply, and they will be heavy for weeks to come, in discharge of the old A.A.A. contracts. But even without them farm income evidently would show increases. Cash income from marketings alone, in the first quarter of the year, was 20 per cent larger than a year earlier."

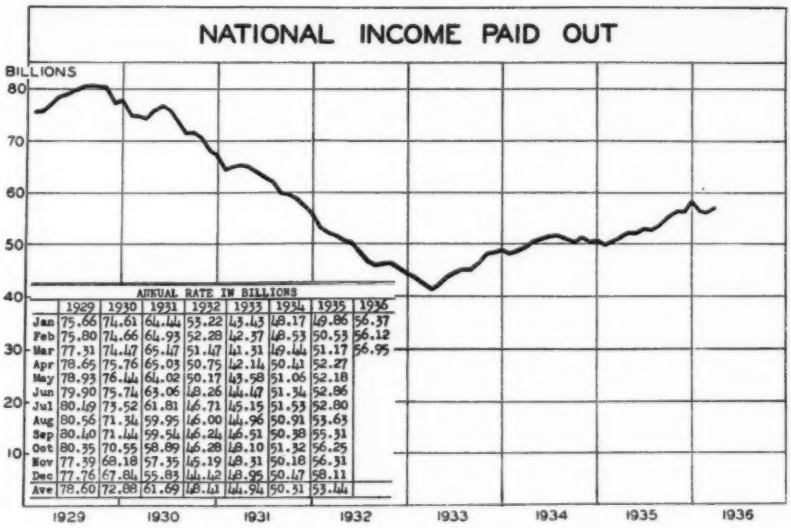
Wanted: Copies of "Steam Shovel News"

"STEAM Shovel News," the predecessor to "Excavating Engineer," was published from December, 1904 to September, 1912. Can you furnish us, or tell us where we might obtain copies of this publication?

WEEKLY BUSINESS INDICATORS



• *Annual rate of income paid out in the U. S. A. is indicated in the accompanying chart prepared by the Cleveland Trust Company. This index attempts to combine estimates for labor income in the form of wages and salaries, property income from dividends, interest, and rents, enterprise income withdrawn by proprietors and partners. Its components are based on the federal monthly data for payrolls, reports of cash marketings by farmers, figures of interest and dividend payments, and the like. It includes federal relief payments. It is the most comprehensive available index of national purchasing power and so of general business activity.*



ANNUAL RATE IN BILLIONS

	1929	1930	1931	1932	1933	1934	1935	1936
Jan	75.66	74.61	64.44	53.22	43.43	48.17	49.86	56.37
Feb	75.80	74.66	64.93	52.28	42.37	48.53	50.53	56.12
Mar	77.31	74.47	65.47	51.47	41.31	49.44	51.17	56.95
Apr	78.65	75.76	65.03	50.75	42.14	50.41	52.27	
May	78.93	76.44	64.02	50.17	43.58	51.06	52.18	
Jun	79.90	75.74	63.06	48.26	44.47	51.34	52.86	
Jul	80.69	73.52	61.81	46.71	45.15	51.53	52.80	
Aug	80.56	71.34	59.95	46.00	44.96	50.91	53.63	
Sep	80.40	71.44	59.54	46.24	46.51	50.38	55.31	
Oct	80.35	70.55	58.89	46.28	48.10	51.32	56.25	
Nov	77.39	68.18	57.35	45.19	48.31	50.18	56.31	
Dec	77.76	67.84	55.83	44.12	48.95	50.47	58.11	
Ave	78.60	72.88	61.69	48.13	44.94	50.51	53.44	

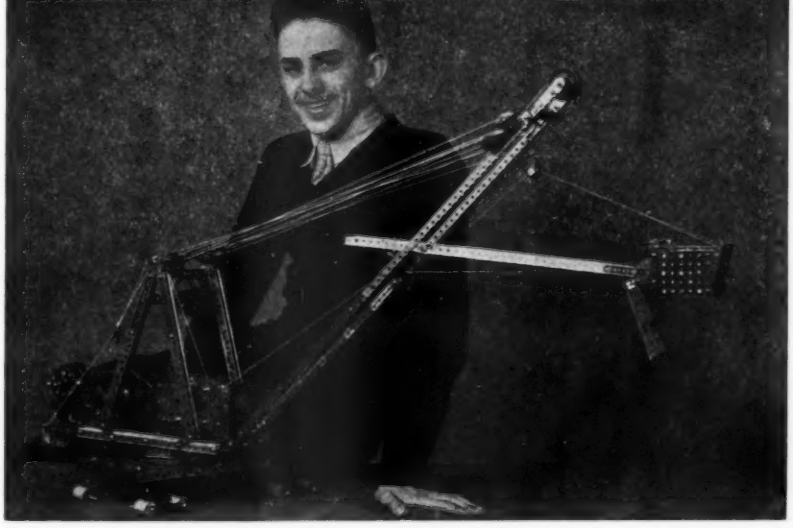
Construction Up In April

CONSTRUCTION contracts let during April were higher than for any other month since October, 1931, with but one exception (December, 1935), according to figures from F. W. Dodge Corporation. April awards amounted to $234,806,300 in the 37 states east of the Rocky Mountains as contrasted with $198,978,300 for March and only $124,020,000 for April, 1935. All major branches of construction shared in the general gains, with non-residential building and heavy engineering projects showing the best relative improvement over a year ago.

Residential building awards during April amounted to $67,151,000 as against $55,220,600 for March and $42,202,800 for April 1935. For non-residential building, the April contract total amounted to $94,242,800 as contrasted with $81,460,300 for March and with $41,328,100 for April of last year. April awards for heavy engineering projects amounted to $73,412,500 as compared with $62,297,400 for March and with $40,489,100 for April 1935.

Improving conditions in the construction industry as compared with a year earlier were noted by the Dodge organization in each major geographic district without exception.

For the first four months of 1936, construction contracts for all classes in the 37 eastern states totaled $780,627,600, making a gain of 85 per cent over the total of $421,781,500 for the corresponding four months of 1935.



Shoveling Concrete

(*Continued from page 286*)

excellent appearance; and if you have an excavating job involving concrete removal, you are pretty sure to think of Speedway when you come to investigate people to do it for you.

It takes time, effort and money to keep equipment looking like new, but you couldn't tell Jack Kolko that it isn't worth it—from an advertising angle, and also from the more important one that emphasis on appearance and condition results in efficient operation of machinery by men who are proud of its condition and what they can do with it.

Do You Remember?

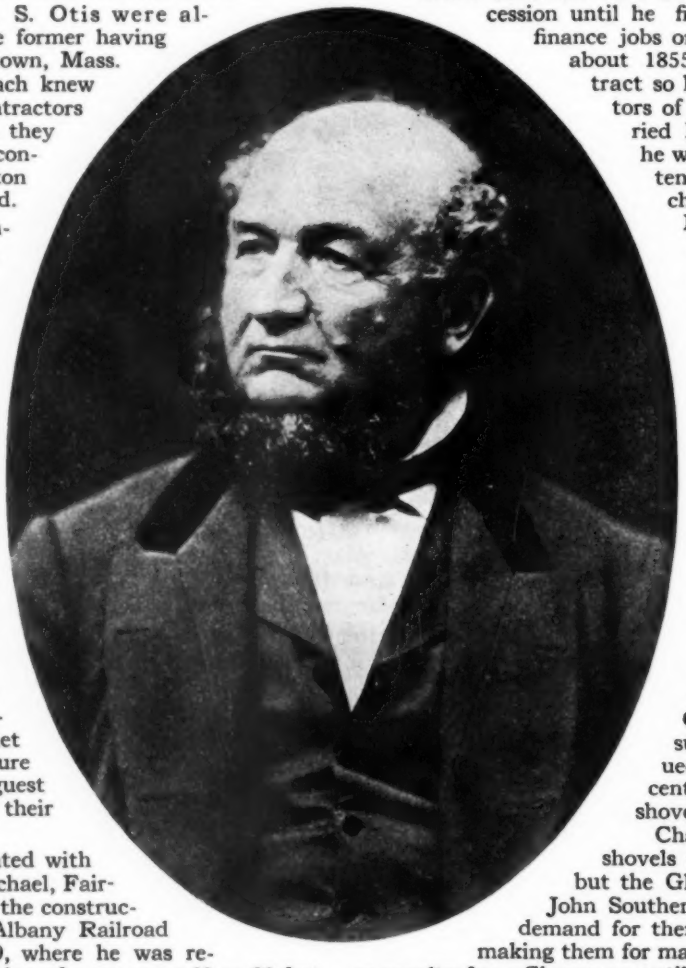
CAN ANY old timer tell us anything about the Otis-type steam shovel pictured on the frontispiece of the April Excavating Engineer? We'd like to know who owned it, where it worked, and any interesting stories you might know, or have heard, about it.

• *This model stripping shovel was built by young George Despres of Manistee, Michigan and took a prize in the 1935 Gilbert Erector contest. Dimensions of this model are: boom, 30"; dipper stick, 18"; height to top of A-frame, 17"; length, 16". The shovel is full revolving; swinging and crawling are the only operations not motorized. George Despres, shown in this picture, is building another model and would like to hear from anyone with the same hobby.*

Oliver S. Chapman

FROM the very beginning Oliver S. Chapman was closely associated with the Otis steam shovel. He had used if not personally operated, the first shovels made. Many years later it was he who revived their manufacture and brought them into general use.

Chapman and Wm. S. Otis were almost the same age, the former having been born at Belchertown, Mass. on August 11, 1811; each knew the other when, as contractors at Canton in 1834-35, they were engaged in the construction of the Boston and Providence Railroad.



Chapman was apprenticed to a wheelwright, but by the time he reached his majority had accumulated enough to build a saw mill. He evidently felt there was a greater opening in railroad construction, disposed of his mill and undertook the construction of the abutments for the Canton Viaduct. Here he first met Otis and no doubt knew all about the efforts of Otis and French to develop the former's idea of a mechanical excavator. Here also he met Miss Everett, the future wife of Otis, and was a guest if not a groomsman at their wedding.

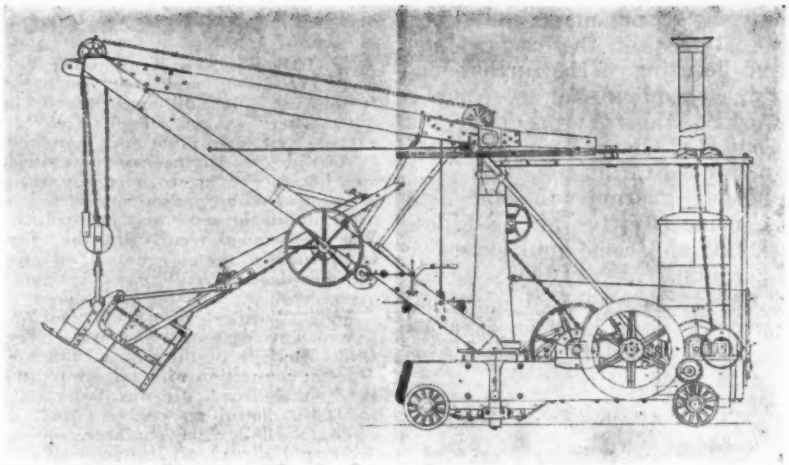
He was later associated with the contractors—Carmichael, Fairbanks, and Otis during the construction of the Boston & Albany Railroad near Springfield in 1839, where he was responsible for the excavation of a cut some 60 or 80 feet deep through solid rock known as the Summit Cut. This work was not completed until 1841. He then retired for a few years on account of his health.

His first wife died during this period and he married the widow of his friend and fellow contractor Otis on March 23rd, 1844. At this time he also returned to contracting. In association with Daniel Carmichael he was engaged in the construction of the Vermont Central at Windsor, Vermont, where one or both of the original Otis excavators was used.

Other contracts were undertaken in rapid succession until he finally became able to finance jobs on his own. Some time about 1855-58 he secured a contract so large he needed excavators of his own. Having married Elizabeth Everett Otis he was in control of the patent rights, and had machines made by the Globe Iron Works, owned by John Souther, and located at the corner of First and A Streets in South Boston. Being well acquainted with the Otis Machine, he felt the need of some improvements in it and wanted an experienced designer to incorporate his ideas. He secured an extension of the Otis patent and was also granted a patent on his improvements.

Thus after a lapse of some fifteen years the manufacture of the Otis Excavators was resumed and has continued ever since, though the center of the production of shovels has moved westward.

Chapman had his initial shovels made for his own use, but the Globe Iron Works (later John Souther & Co.) found such a demand for them that they continued making them for many years under a license or royalty from Chapman, until they went out of business about 1910. Chapman made his home in Canton, owning and living in the same house in which he resided as a young contractor in 1835. He died on February 8, 1877, beloved and highly respected by the community for which he had done so much. He is buried there in the cemetery in the same plot with Otis.



• *John Duncan was granted an English patent for the Otis shovel in 1842. This drawing, which accompanied his application, is practically identical with the Rufus Mason drawing of 1841.*

Digging by "Stame"

The reception and early use of the Otis Shovel in England, and the second stage of development in the United States are told in this installment

By WILLIAM ELLISTON FARRELL

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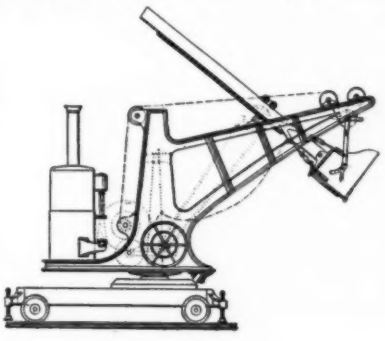
This is the third installment in the story of the invention and early development of the steam shovel. If you missed the first two, you will find them in the April and May issues of Excavating Engineer.

NO RECORD has been found as to the negotiations which led up to the shipment to England of one of the Otis Shovels built in Philadelphia. It is a matter of record, however, that a John Duncan, reported to have been engaged for some time as a solicitor to various railway companies, was responsible for the introduction of the machine into England, and that the construction and licensing of further machines for England and the Continent were entrusted to a John Braithwaite. This was the result of letters of endorsement of the shovel received from Major Whistler, Captain Swift and Major MacNeill, all prominent chief or consulting engineers of American Railways.

There is also some doubt as to which of the seven shovels went to England. The date of its arrival there is also not recorded but it was in use as early as 1842.

The English shovel was put to work on the Eastern Counties Railway, as the following quotation from an article printed early in the year 1843 shows:

"Rumor had informed us, that an American Excavator on railways worked by steam existed, which could perform the labor per day in getting and filling of 100 men, and could in all ordinary soils excavate 1,000 cubic yards per day. It was reported to us that such a machine had arrived in this country, and that it was to be seen at work upon a bank of stiff clay adjoining the Eastern Counties line near Brentwood; and we proceeded on Tuesday last to the spot. It is impossible in adequate terms to express our gratification at the visit.



"We sincerely desire that it may have every success, and also its twin brother, the Excavator under water, which we understand is, if possible, a still more efficient machine than the dry land excavator. The invention is one which reflects the greatest credit upon the mechanical skill of the United States, and of the inventor, Mr. Otis, who, unfortunately, does not live to be gratified with its success; and every man in England who desires to witness the triumph of machinery, will be well repaid by a journey down the Eastern Counties Railway to Brentwood, to visit it when at work. The public are indebted, we believe, for the introduction of the machine into this country to the enterprise of Mr. Duncan, in whose name the patent stands, and who has long been known to be engaged as a solicitor to various

• *In 1876, the English firm of Dunbar & Ruston was granted a patent for the full revolving shovel pictured here. No such shovels were built, however, until some 15 years later.*

Railway Companies; and when we state that the construction and licensing of the further machines required for the public works of this country, and of the Continent, have been entrusted to John Braithwaite, this is a sufficient guarantee that they will be made effective to the fullest extent, and come into extensive operation."

This article elicited one comment of such interest that its inclusion in this article seems worth while.

What's All the Fuss About?

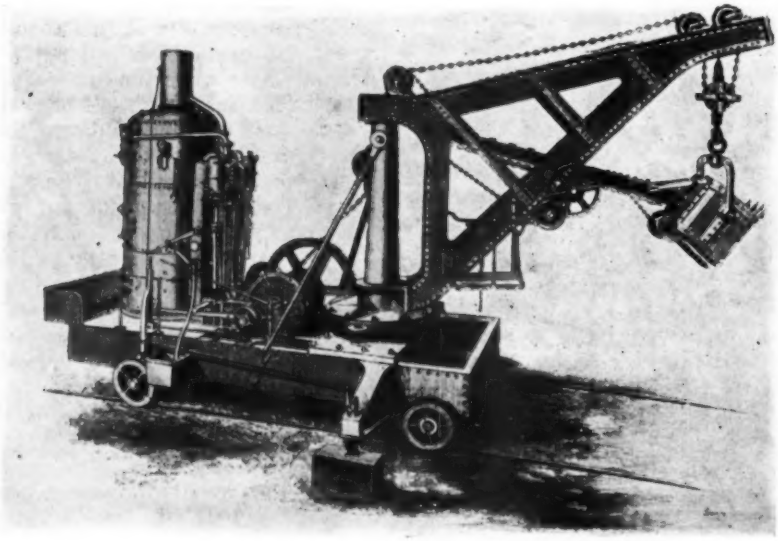
"Sir —

I see in the Railway Journals an account of an extraordinary excavating machine—a real 'Giant'—which has been imported from America and may be actually seen at work in the Brentwood cutting of the Eastern Counties Railway, doing such superhuman wonders that half of the race of 'navies' may thenceforth consider their 'occupation gone.' 'The machine is made,' quoth one would-be emphatic writer: 'it can work admirably; it must come into use; and it is utterly futile to weep over the deprivation of employment to navigators.'

"Let us see. The machine, it is said, can 'perform the labor per day, in getting and filling, of 100 men, 'and the proof is that it lifts and fills' nearly a cubic yard and a half of stiff clay in about the same space of time as a laborer would lift and fill a foot cubic. 'But a cubic yard and a half is equal to 40½ cubic feet only; so that, testing the assertion by proof adduced, the pretented performance is at once reduced to 59½—nearly one half: Now to say that it can do the work of 59½ men is saying nothing; unless it could be also shown that it can cost less than as many men would. The engine is worked by steam power, but what the amount of that power is, the 'touters' of the 'Giant' have thought it prudent to conceal. Is it of 40, or 50, or 100 h.p.? From a cursory glance at it I would say somewhere about 40. Now that a 40 h.p. steam engine should do more than the work of 59½ men, or even 100, or even twice 100, is anything but cause for exultation. If that is all it can do, the 'navies' have nothing to fear. For, besides the cost of the steam power, some further inconsiderable deductions must be made for interest on the price of the machine, loss from tear and wear, and the wages of the two or three men required to work it.

"So much for the performances of the 'Giant,' a word now as to the mechanical scale shown in its construction. So huge, clumsy, and multudinous a combination of beams, shafts, posts, cylinders, pistons, levers, chains, wheels,

(Continued on Page 312)



• *Patented in 1877 by an Englishman named Chaplin, this shovel is very like the Otis except that the revolving mechanism has been moved to the bottom of the mast and steel seems to have supplanted wood in the construction.*

George Washington Whistler

MAJOR WHISTLER was born May 19, 1800, and was graduated from West Point Military Academy in 1819. There was no school or college except West Point that was then able to provide an engineering education; and because engineers were absolutely necessary for the preliminary survey in determining the route of a railroad, the War Department recognizing the value of railroads to the government, adopted the practice of lending or assigning army engineers for this purpose.

Major Whistler's first assignment was as assistant engineer under Major Wm. Gibbs McNeill in the years 1828 and 1829 in connection with surveys for the B. & O. Railroad. He was, from 1837 to 1840, consulting engineer and, in 1840 to 1842 chief engineer, on the Western Railroad of Massachusetts. It was while he was acting as consulting engineer for this road that he made the acquaintance of Chevalier de Gerstner.

Major Whistler was engaged to become consulting engineer for the St. Petersburg and Moscow Railroad, for which position he left the United States early in the Spring of 1842.

He had had a practical demonstration of the real value of the steam shovel while the Western Railroad was under construction. It was, therefore, perfectly natural that he should contemplate using these machines in Russia.

The records conflict as to whether four shovels were purchased by Russia or whether, as reported, a contract for excavation on the Russian Railroad, amounting to some 2,500,000 cubic yards, was awarded to the firm of Carmichael and Fairbanks. In any event, four Otis shovels were shipped to Russia.

The records state that "Whistler was forced to organize and plan everything 'from a wheelbarrow to a steam excavator.' " He not only acted as consulting engineer for the railroad but, as time went on and his full value was appreciated, he was consulted on all military engineering and river and harbor improvements. He was given the Cross of the Order of St. Ann. While the corruption prevalent in high places attacked him, his integrity withstood every trial and temptation. In 1848 Whistler contracted cholera but recovered. On April 7th, 1849, he passed away during a heart attack and was succeeded by Major Thompson S. Brown.

His body was brought to the United States and is buried in Greenwood Cemetery under a cenotaph designed by Julius W. Adams and erected by his fellow engineers. Major Whistler left a son no less distinguished in the field of portraiture than his father was an engineer, the portrait of his mother being universally familiar.

WHAT A BEATING BEADS* TAKE ON DUMP TRUCKS!

—But Beads in Improved High Profile Goodyears Can Take It

Improved High Profile Goodyear Truck Tires are made with heavy, braided-wire beads, securely tied in by the plies of the tire. And your truck tires need strong, dependable beads just as an athlete needs strong ankles.

You'll get better performance from these improved Goodyears. Ask your Goodyear dealer to show them to you.

They are bigger, sturdier, tougher—more rubber, more cotton, more air space. They have longer side walls. That means less generation of heat, more diffusion of heat that is generated. In every way they give you more for your money—yet they cost no more.

Other reasons why they're MONEY SAVERS are these: Supertwist Cord construction—All-Weather tread—heat-resisting rubber—and Pima Cotton, the longest cotton fibre grown.

THE GOODYEAR TIRE & RUBBER COMPANY, INC.
AKRON, OHIO

***EXTRA STRONG BEAD CONSTRUCTION**

To provide strength for heavy loads, swaying loads, high loads, Goodyear truck tires have an extra-strong, heavy, braided-wire bead—wide and securely tied in by the plies of the tire. This construction insures a firm seating of tire on rim. The larger size truck tires have dual beads.

GOODYEAR TRUCK TIRES money savers

For your convenience in writing to the Goodyear Tire & Rubber Company, Inc., you will find a card bound in this issue.

CONTROL *means* LUG

CONTROLLI

(Above)
These fast-stepping Model "L-O" Tractors and 7-yard Continen scrapers are grading, leveling and ing on an Illinois highway job. Two three new units owned by Winneb County Highway Department.

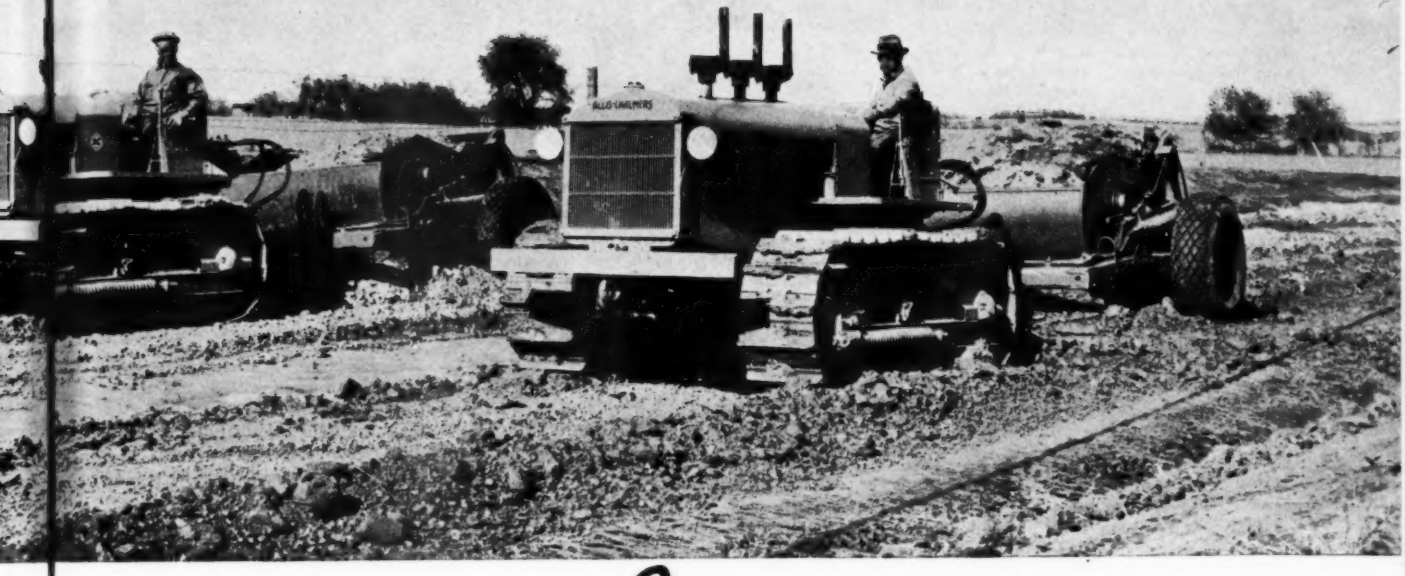
• •

(Left)
"They sure move dirt", says Will L. Lathers, Jr. of his 3 Model "L Oil Tractors and 7-yard Contine Scrapers. No time wasted on this j Big loads and plenty of speed ass big yardage at low cost.

ALLIS-CHALMERS *Controlled Ignition* **OIL TRACTORS**

TRACTOR DIVISION—MILWAUKEE, U. S. A.

GING ABILITY



LLIGNITION PRODUCES *Smoother* POWER!

IN ANY tractor ... normal engine wear may cause clearances, compression pressures and temperatures to vary in different cylinders. Unless the firing point in each cylinder is controlled, these variations effect the TIME of combustion ... which in turn results in uneven explosive forces, "jerky" power, and reduced lugging.

In the Allis-Chalmers Controlled Ignition Oil Engine ... combustion MUST take place at exactly the proper time. The result is a smooth flow of controlled power ... which is absolutely essential to lugging ability. That is why an A-C Controlled Ignition Oil Engine will outlug and outpull a compression engine of the same number of cylinders and comparable bore and stroke.

Only in the Controlled Ignition Oil Tractor can you have maximum Diesel fuel oil economy without the handicaps of high compression ignition. Investigate before you buy.

CONTROLLED FUEL INJECTION

PROPER MIXING BEFORE IGNITION

SPARK IGNITION—COMPLETE, INSTANT COMBUSTION

CONTROLLED IGNITION—Diesel fuel oil is injected into the combustion chamber of the Controlled Ignition Oil Engine at 60° before top dead center. Sufficient time is provided for thorough mixing with the air—after which the mixture is ignited with a spark—at a CONTROLLED point. No chance of pre-ignition . . no need of special rings . . no heavy, unbalanced parts . . no problem of split-hair tolerances.

CONTROLLED INSTANT STARTING—Two or three upward pulls of the crank, or a push on the starter—and the A-C Oil Tractor STARTS, regardless of weather.

CONTROLLED INJECTION OF FUEL—An accurate, measured charge of fuel is sprayed (not squirted) into the combustion chamber—in proper proportion to load and throttle setting. Simple, easy-to-service fuel pump—requires no special tools. Each cylinder can be serviced individually. Accurate measuring at idle speeds.

CONTROLLED AIR-FUEL RATIO—No excess of air at idle speeds to lower exhaust temperatures at the expense of power. Proper ratio maintained for efficient combustion at All Speeds.

SHOTS *from the Firing Line*

When the Waters Went Down

THE CRISES brought on by the floods which left their devastating mark on the northeastern section of the country were met by heroism and valiant effort in many fields. Much has been said about the speed with which such public services as power, light, telephone, and water systems were restored. Less has been said, and less is known, of the work which has gone into clearing up debris by hand and with machines, gone into reopening transportation routes. Here are some incidents involving excavating equipment which have come to the attention of representatives of Excavating Engineer:

From New Hampshire comes a report of a flood job, with a picture particularly interesting now that summer heat is on or near us. Arthur Whitcomb, Keene, New Hampshire contractor, writes: "My Bucyrus-Erie 10-B had a rather unusual job after the flood. One of the rivers here went on a rampage and deposited tons of ice on a two-and-a-half mile stretch of the main road to Boston. The ice ranged in depth from two to fifteen feet, and was so packed and wedged together that it was necessary to dynamite it in places.

"The 10-B worked night and day, with two operators on eight-hour shifts, under the supervision of state engineers. They were surprised and enthusiastic at the speed with which the machine cleared up the road under the unusual conditions."

• *Subsiding flood waters left so much debris on the streets of Wheeling, West Virginia that truck-mounted power shovels were used in cleaning up.*

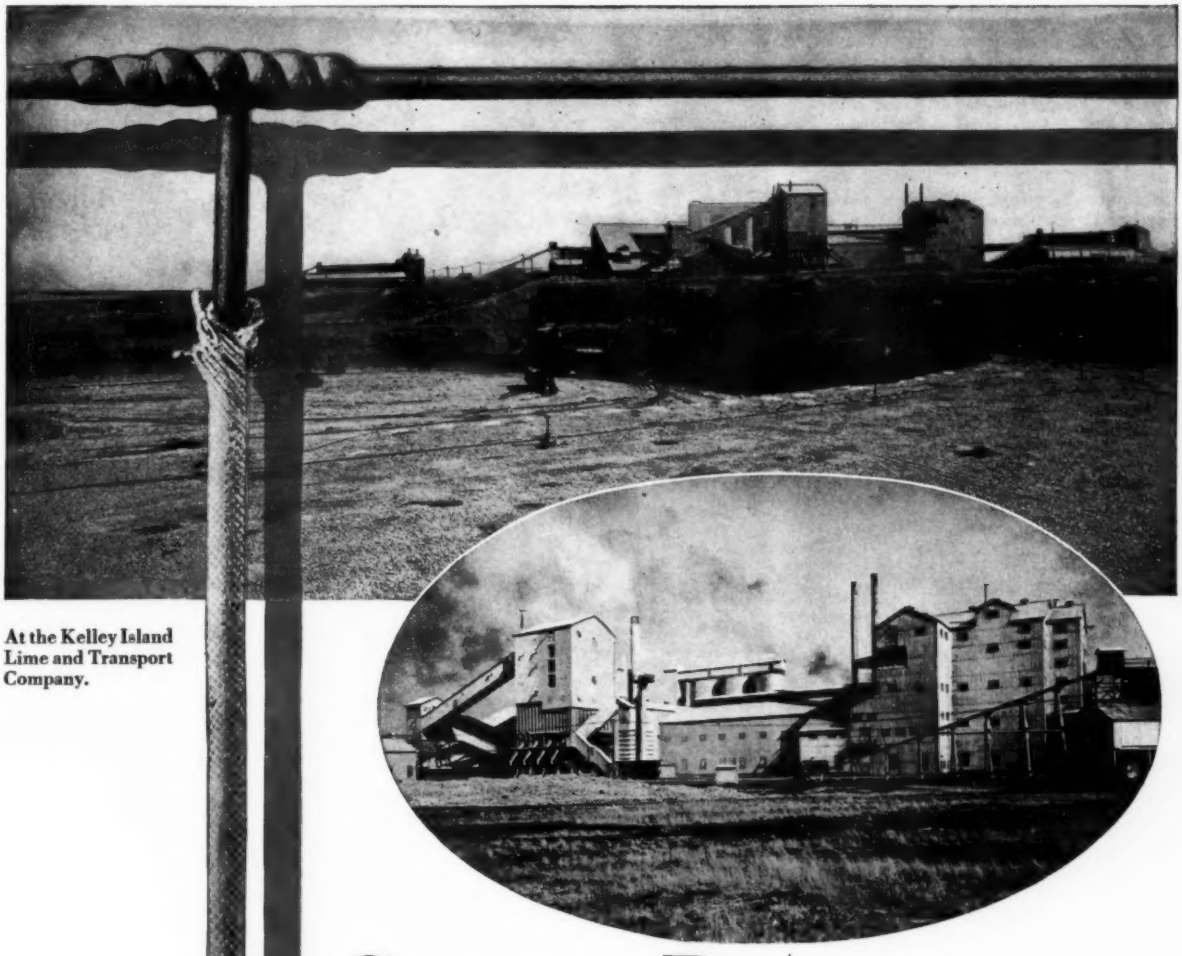
On the Connecticut river, near Holyoke, a Universal and a Northwest clamshell were quickly put to work removing flood rubbish just below the Holyoke Dam. In neighboring West Springfield, a Universal crane covered

• *A 2½-mile stretch of main road between Keene, New Hampshire, and Boston was covered by tons of ice deposited by a flooded river. Working two eight-hour shifts a day, Arthur Whitcomb's 10-B opened the road.*

flood damaged articles so enterprising scavengers could not recover and make off with them.

* * *

In Wilkes-Barre, Pennsylvania, the usual situation was reversed, and three Marion and one Osgood shovels had to be salvaged and the machinery dried out before helping in further clean-up work. These machines had been working on the 400,000 yard W.P.A. Susquehanna River Flood Control Dike when they were submerged by the rising waters. In the town of Wilkes-Barre as high as $150 per day was offered at one time for gasoline pumps to empty city basements. There was no "juice" for electric pumps, and few gas ones could be obtained.



At the Kelley Island Lime and Transport Company.

CORDEAU-BICKFORD *at the* Kelley Island Lime and Transport Co.

They want "little pieces" at the White Rock Plant at Clay Center, Ohio. Little pieces mean easier removal; save time, save shovels, save powder.

Better Fragmentation is but one of the five reasons why Cordeau-Bickford Detonating Fuse is used here—as elsewhere in the quarrying industry.

Here are the five reasons:

1. More Work from Explosives: each cartridge is detonated directly and has the added force of a primer cartridge.
2. Simplified Loading: there are no caps in the holes.
3. Less Hazard: Cordeau-Bickford is insensitive to ordinary shocks. It must be detonated.
4. Fewer But Bigger Shots: equipment moved less often, for Cordeau-Bickford not only detonates each hole but connects all holes.
5. Better Fragmentation: planned rotation firing, possible with Cordeau, permits split second relief of burden, letting each charge work to best advantage.

Cordeau-Bickford Detonating Fuse is manufactured with the same care that has made Ensign-Bickford Safety Fuse famous since 1836. Let us send you a copy of our Centennial Booklet—and tell you more about Cordeau.

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The ENSIGN-BICKFORD COMPANY, Simsbury, Connecticut

SAFETY FUSE Since 1836 • CORDEAU-BICKFORD DETONATING FUSE

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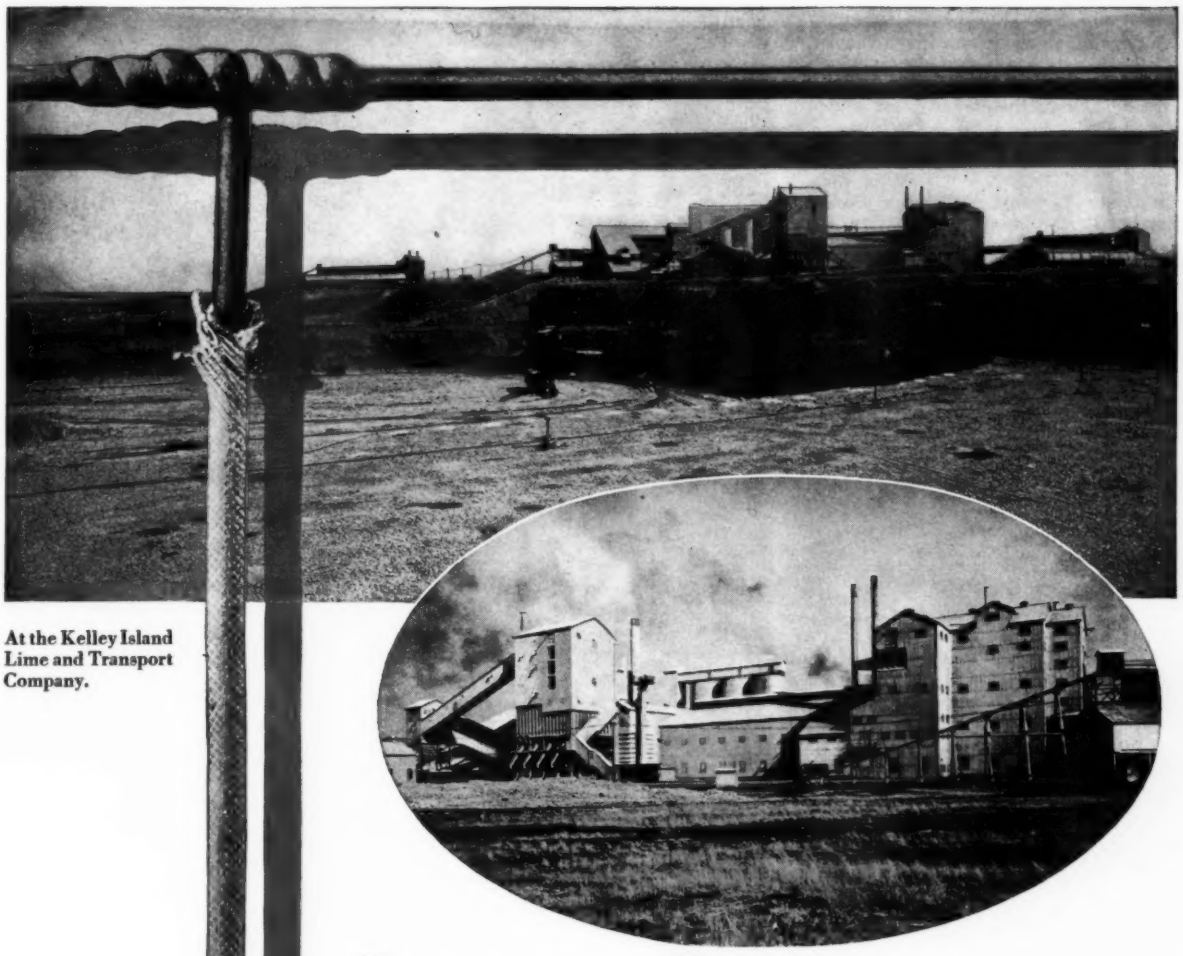

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3. Less Hazard: Cordeau-Bickford is insensitive to ordinary shocks. It must be detonated.
4. Fewer But Bigger Shots: equipment moved less often, for Cordeau-Bickford not only detonates each hole but connects all holes.
5. Better Fragmentation: planned rotation firing, possible with Cordeau, permits split second relief of burden, letting each charge work to best advantage.

Cordeau-Bickford Detonating Fuse is manufactured with the same care that has made Ensign-Bickford Safety Fuse famous since 1836. Let us send you a copy of our Centennial Booklet—and tell you more about Cordeau.

1836 BEGINNING A NEW CENTURY 1936 · ENSIGN-BICKFORD SAFETY FUSE ·

CB-52

The ENSIGN-BICKFORD COMPANY, Simsbury, Connecticut

SAFETY FUSE Since 1836 • CORDEAU-BICKFORD DETONATING FUSE

For your convenience in writing to The Ensign-Bickford Company, you will find a card bound in this issue.

As indicated in the accompanying photograph, shovels were given the job of cleaning up masses of debris which blocked the streets of Wheeling, West Virginia, when the water went down.

* * *

In Hartford, Connecticut, A. I. Savin, president of the A. I. Savin Construction Company, put his one-yard Northwest clamshell to cutting a 12-foot sluiceway through the Colt Dike to let out the water which had flowed in over the top of the dike. Sides of the sluiceway were constructed with Bethlehem sheet steel piling, driven with a 500-lb. drop hammer swung by the Northwest, and the sill was made with heavy timber. This job was completed in less than three days.

* * *

Not all the work with excavating equipment was confined to the post-flood period. On March 19, with the Connecticut rising rapidly, the city of Hartford decided to build a temporary three-foot barrier on top of Clark Dike. Under the supervision of city engineers, the Edward Balf Company moved two ¾-yard Bucyrus-Erie steam shovels and 20 trucks out to the dike.

Starting in the afternoon, the shovels worked at top speed, digging clay loam to be used as filler. Darkness came; the work went right on—and so did the water. About midnight, after the shovels had handled about 1,500 yards each, the flood surged over the dike and the operators and firemen had to leave their machines and run for their lives to the trucks whose drivers were impatiently waiting. High ground was reached barely ahead of the raging water. Even ten days later, only the upper parts of the shovels were visible, tiny islands in a wide wilderness of water.

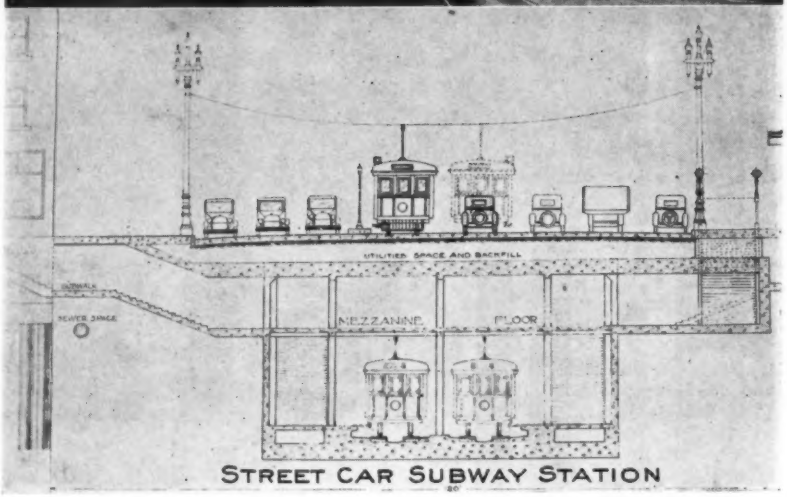
* * *

Undoubtedly there were countless other incidents of heroic struggles to protect and salvage property . . . struggles that would have been unnecessary had adequate flood control measures been taken beforehand. The complete story cannot yet be given; it probably will never be fully known. From the isolated bits which do come to light, however, it is not difficult to picture the tremendous activity which took place throughout the entire flood area, with excavating men and machines contributing their share of effort and courage.

Not the Red Sea

IT WAS necessary for Stewart & Nuss, Fresno contractors, to move their Bucyrus-Erie 1030 dragline across a 30-foot irrigation ditch in which the water was six feet deep. Unlike the Bible story, the waters didn't roll back, so operator "Slim" Rogers moved the machine through the water, which was nearly a foot deep over the deck. No trouble was experienced till a steep far side of the ditch was encountered. Here, a Caterpillar tractor helped out.

The 1030 was being moved from Stratford to Fresno, California. The tank at the rear contains Butane, the fuel burned by the dragline.



STREET CAR SUBWAY STATION

• *Above: Heavy traffic shown on San Francisco's Market Street will be greatly relieved when the proposed subway is completed. Below: Cross section drawing of the proposed subway. Surveys and maps are now being drawn up.*

San Francisco Plans $52,000,000 Subway System

By C. W. Geiger

GROWING traffic in the downtown section of San Francisco has raised such problems that plans are now under way for the construction of 8½ miles of subway, to be divided into three sections. A 2½ mile section under Market Street, passing under the San Francisco Bay Bridge interurban terminal and providing for easy transfer between the two systems, will be the first to be constructed.

The cut and cover method of excavation will be used, and a box-type section constructed. Inside height, above the top of the rails, will be 15 feet to permit initial operation of trolley cars, although trains using a third rail are eventually planned.

Actual construction of the section, without too much interruption of the traffic which flows over the 120-foot width (76 feet between curbs) of Market Street, will present some interesting problems. West of First Street, the material to be excavated is sand on top of clay and should offer no difficulties beyond heavy lagging and shoring. Other sections of the excavation, however, involve made land, low enough to be affected by tide movement, and prob-

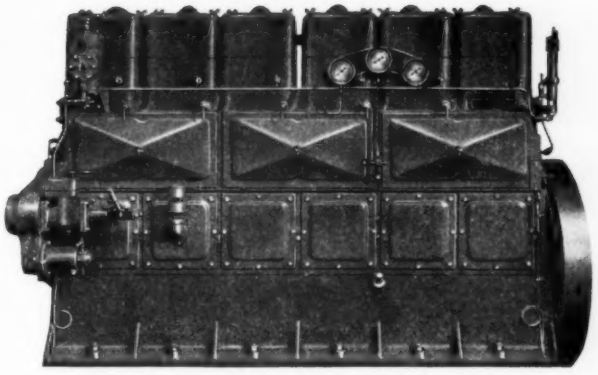
YOU CAN'T BEAT this combination

When you combine the advantages of reliable and economical Atlas Diesel power with the high output capacity and remarkable soft-ground mobility of the Bucyrus-Monighan Walking Dragline Excavator, you have a combination that spells satisfactory operation and good profits for the levee builder.

Designed especially for work where long booms, big output and soft-ground maneuverability are requisite, this Atlas Diesel powered unit is the answer to the present trend toward light weight equipment which can handle maximum yardage at minimum cost, and which can be readily shipped from one job to another.

Above is a picture of one of these remarkable Bucyrus-Monighan Walking Dragline Excavators powered with a 6 cylinder 200 H.P. fully enclosed Atlas Imperial Diesel. It is shown in levee construction work near Morton, Mississippi, in the service of the Domingos Construction Co., and according to the owners, the performance of this unit has far exceeded their expectations.

When you have a dirt moving job that is a big one, on which the margin of profit may be close—buy



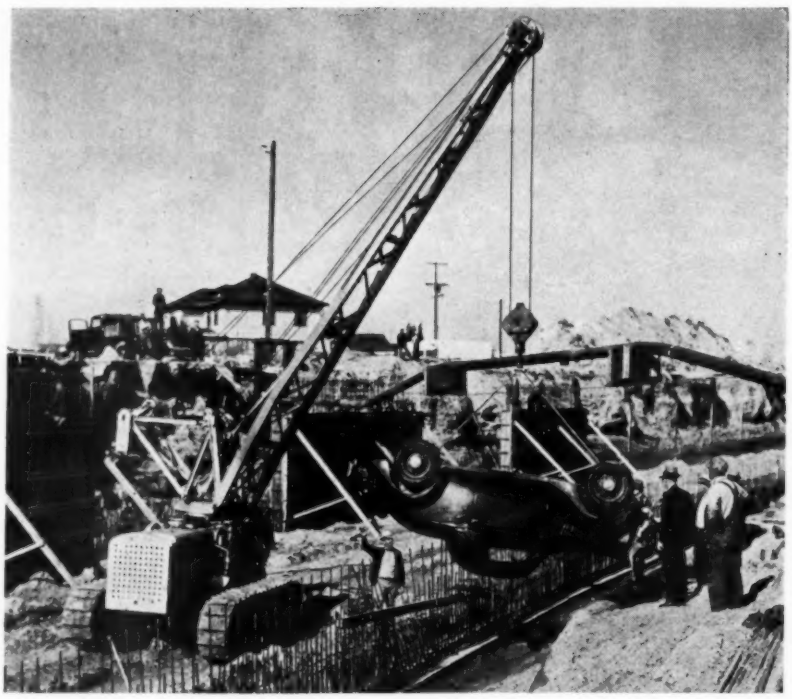
Atlas Diesels of the fully enclosed type illustrated above are available in 3, 4, 6, and 8 cylinder models in the following range of horse powers: 45, 60, 80, 90, 120, 140, 150, 165, 200 and 275.

an Atlas Diesel powered shovel or dragline and be assured of reliable power at the lowest possible cost. Atlas Diesels pioneered the excavating field and there are today more Atlas Diesels powering shovels and draglines than the engines of all other Diesel manufacturers combined. Your inquiries are solicited and given prompt attention.

ATLAS IMPERIAL DIESEL ENGINE CO.
OAKLAND, CALIFORNIA :::: MATTOON, ILLINOIS

ATLAS IMPERIAL

For your convenience in writing to Atlas Imperial Diesel Engine Co., you will find a card bound in this issue.



• A missed sign—and this motorist plunged over the embankment into the U. S. Engineers' Ballona drainage project in Los Angeles, turning his car upside down but not seriously damaging it or himself. He chose the spot fortunately, as this Bucyrus-Erie CT-50 Loadmaster turned from lifting concrete forms into place long enough to set his car back on the road.

---

ably containing old piles and abandoned vessels. Pipe lines, wire, conduit, and sewers will have to be moved or relocated. The width of the street makes attention to foundations of adjacent buildings not a particular problem.

The method of procedure is planned about as follows: the surface of the street will be opened and transverse steel beams on vertical posts installed. Heavy plank decking laid on these beams will carry surface traffic while the excavating goes on. Some of the conduit and wire lines can be hung from the steel beams, but sewers and gas pipe will have to be relocated, probably in the space indicated for the purpose on the accompanying illustration. Immediately below street level, a six-foot space will be left as permanent location for conduit, etc.

A survey is now being made to obtain information on all buildings, subsurface pipe and sewers. Two sets of maps will be drawn up, one covering surface topography — buildings and their entrances, sidewalks, hydrants, lamp posts, and traffic signals. The other maps will show ducts, foundations—all projections below surface.

For this survey the W.P.A. has contributed $82,500 and the city $5,000. The project is sponsored by the San Francisco Public Utilities Commission of which E. G. Cahill is manager and Paul J. Ost chief electrical engineer. L. M. Perrin well act for the commission in making detailed arrangements, and the project comes under Bayly Hipkins, PWA District Supervisor.

While only the Market Street section of the subway is definitely contemplated at this time, it is believed that the two others will not be long in following. Total cost of the 8½ miles is estimated at $52,000,000.

Conchas Dam

PLANS and specifications for construction of Conchas Dam on the South Canadian River in New Mexico, will be ready for formal advertisement about June 15, according to information received from Hans Kramer, U.S. District Engineer at Tucumcari. The dam is to provide for flood control and storage of water for irrigation and water supply, although distribution works for these latter are not included in the present project.

The dam will consist of a concrete gravity main section approximately 220 feet high and 1,160 feet long, with earth dikes on each side having an overall length of about four miles. The main section will contain conduits located in its base to maintain low water flow and to drain the reservoir, and an overfall spillway 300 feet long. About 700,000 yards of concrete will be used in the main section, and 3,400,000 cubic yards of fill material will be needed for the earth dikes. The north dike will contain a concrete-surfaced emergency spillway 3,000 feet long to handle large floods. An irrigation outlet and a water supply outlet will be constructed through the dam to provide for future take-off of the stored water.

The dam will create a reservoir with a storage capacity of approximately 600,000 acre feet and an area of about

---

• Pulling down a mine building to replenish the supply of shore timbers used in rescuing D. E. Robertson and Alfred Scadding from the Moose River gold mine was only part of the work done by four Caterpillar tractors owned by the Department of Highways. Grading roads to permit passage of boilers, cranes and heavy timbers, all of which played an important part in the heroic rescue, these machines again proved what can be achieved by skillfully coordinated efforts of man and machine.

"COST LOWERING" PERFORMANCE

SULLIVAN'S
L-9 55-Lb. Rock Drill
DRILLS
CONSISTENTLY
FASTER

Sullivan has produced the L-9 in answer to the challenge hurled at rock drill manufacturers to make a machine which will stand up. To overcome the tough conditions of drilling rock, Sullivan has gone to the greatest expense to give you the least expense. FINE STEEL CAREFULLY HEAT TREATED, MACHINED AND GROUND TO MEET THE REQUIREMENTS OF EXACTING DESIGN FORMS THE BACKBONE OF THE L-9. *Furthermore,* to protect the working parts of the L-9 from the dust and grit conditions met in rock drilling, Sullivan has incorporated in its design A SUPERIOR OILING SYSTEM. Sullivan's flush principle of oiling not only bathes every working part in oil, but also washes out gritty and abrasive rock particles. This is the only successful method of DEFEATING THE GRINDING COMPOUND caused by rock drilling conditions. Consequently, for complete satisfaction use L-9s on your job.

SULLIVAN MACHINERY CO.

307 N. MICHIGAN AVE., CHICAGO, ILLINOIS

SULLIVAN makes Rock Drills & Accessories, Air Compressors, Detachable Bits, Coal Cutters, Hoists, Core Drills

For your convenience in writing to Sullivan Machinery Co., you will find a card bound in this issue.

• A new slant! Workers placing steel reinforcement for concrete facing on the dike which will form part of the northern shore of Cajalco Reservoir have to walk carefully and at an angle. It doesn't seem to bother them, though.

26 square miles. Dead storage will account for 100,000 acre feet, irrigation storage about 300,000 acre feet, and flood control 200,000 acre feet.

A construction camp is being built at the damsite, and a 25-mile construction road from Newkirk, New Mexico, to the camp is now open for use.

Cotton in Highway Construction

USE of cotton fabric as a reinforcement membrane in bituminous surface treated highways, and cotton mats for curing concrete highways has been receiving considerable attention from engineers recently. The Secretary of Agriculture has approved funds amounting to $1,300,000 to stimulate field tests of these new uses for cotton.

Fabric for a maximum of 1,000 miles of bituminous surfaced roads will be provided. An aggregate of approximately 80,000 mats for curing concrete will be made available for an average of at least three projects in each state.

Previous experimental work on concrete curing mats has been carried out by the Bureau of Public Roads and the Texas State Highway Department. South Carolina and some other states have experimented with the cotton fabric. Results to date have been satisfactory and indicate that use of cotton may reduce highway maintenance costs and increase life of surfaces.

Progress on the Aqueduct

By Kay Campbell

BY MAY 1, 1936, less than seven miles of main tunnel remained to be excavated on the Colorado River Aqueduct. All but about four miles of distribution tunnel was completed; and nearly half, or approximately 45 miles, of the tunnel lining has been placed.

The two 1700-foot, 29-foot diameter, Parker Dam diversion tunnels have been holed through, and J. F. Shea Company crews are preparing them for lining placement. Excavation is in progress for the powerhouse forebay on the California side, and for the spillway approach cut on the Arizona side.

Griffith Company crews have completed 47 per cent of the excavation for the Cajalco Reservoir. Dixon and Bent have finished work on West Eagle tunnel, bringing the total number of tunnels completed to ten. Little Morongo Siphon, Fan Hill Conduit and Siphon and Schedule 20-C have been finished.

Bids for Lake Okeechobee Levee

SEALED bids in duplicate for construction of approximately 15.75 miles of levee on the north shore of Lake Okeechobee, Florida, containing about 7,000,000 yards of unclassified materials have been asked for by the U. S. Engineer, Jacksonville, Florida.

Bids will be received at his office in Jacksonville up to 10 A.M. June 16, 1936. Bids are also asked on dredging of 1.5 miles of floodway channel which involves the removal of about 600,000 yards of unclassified material.

Caballo Dam Contract Awarded

THE CONTRACT for construction of Caballo Dam on the Rio Grande near Hatch, New Mexico, has been awarded to Mittry Brothers Construction Company of Los Angeles on its bid of $957,018. The Mittry Brothers bid was the lowest of 17 received.

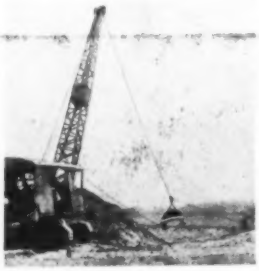
Public Works Administration allotments of $1,500,800 to the International Boundary Commission and $1,000,000 to the Bureau of Reclamation were made for construction of Caballo Dam. The Bureau is building the dam under an agreement between the Secretaries of Interior and State.

Caballo Dam will be an 85-foot structure 4,250 feet long of moistened and rolled clay, sand and gravel embankment construction. The downstream slope will be covered with a heavy rock fill and the upstream slope will be covered with a 2-foot layer of rock riprap, part of which will be underlaid with a 1-foot layer of gravel. The reservoir will have a capacity of 350,000 acre feet of water.

Other features of the construction are a concrete-lined tunnel, a spillway, and a diversion dam in the Percha Arroyo from which a canal will lead water into the reservoir above Caballo Dam.

The tunnel will be used in diverting the water of the Rio Grande past the damsite during construction and upon completion of the dam will house the

How About Adding 200 Ft. or More to the Reach of Your Dragline?



Any crane or dragline can be converted into a slackline excavator with the help of a Crescent scraper bucket and a few hundred feet of cable. Write for descriptive booklet.

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474 S. Clinton St.
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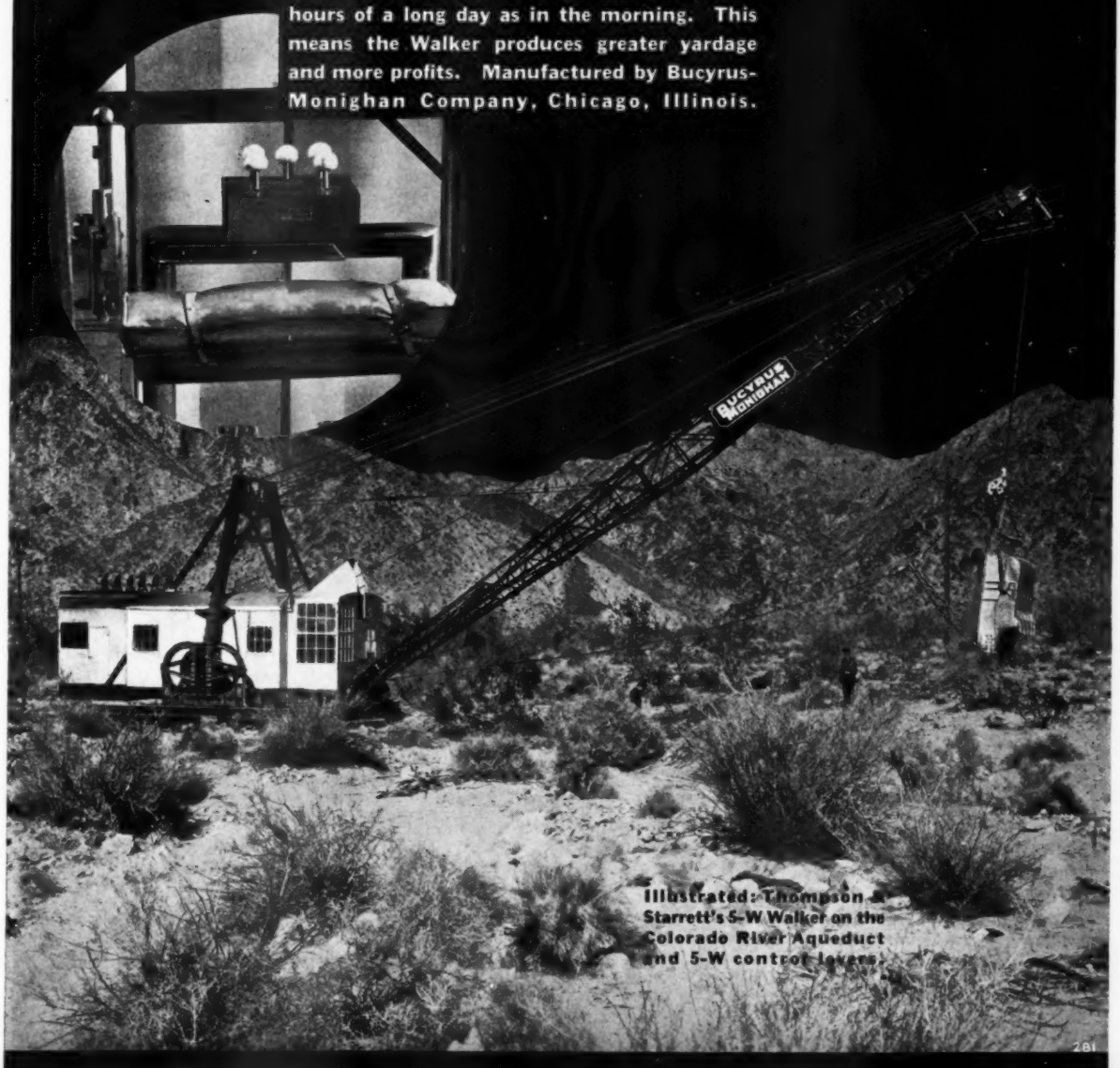
BUCYRUS-MONIGHAN

employs short, easy-working levers, operating air valves and giving true "finger-tip" control. The operator is as fresh during the closing hours of a long day as in the morning. This means the Walker produces greater yardage and more profits. Manufactured by Bucyrus-Monighan Company, Chicago, Illinois.



Illustrated: Thompson & Starrett's 5-W Walker on the Colorado River Aqueduct and 5-W control levers.

281

BUCYRUS MONIGHAN

Sold by BUCYRUS-ERIE CO.
SOUTH MILWAUKEE, WISCONSIN, U.S.A.

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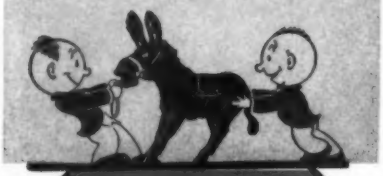
BECO
PUSH-PULL
JACK



HERE'S an all-round Push-Pull Jack that pound-for-pound does more work than any other jack you ever saw. It weighs less than 15 pounds—and has a capacity of 35,000 pounds! No matter how unusual your push, pull, clamp, or straightening problem may be, BECO Jack is the tool that gives you a safe, sure, and proved means of doing the job in a hurry. The drop-forged nuts, lever socket, ratchet and screw are heat-treated so that a welding heat will not damage the jack. Screw lengths—10", 12", 14", 16", and 18". Send for bulletin.

BUCYRUS ERIE

228-D

BUCYRUS-ERIE

EXCAVATING, DRILLING & MATERIAL-HANDLING EQUIPMENT • • SOUTH MILWAUKEE, WIS.

permanent diversion works. It will be 560 feet long and 14 feet in diameter. It will pass under the left abutment.

The spillway will be an open channel on the left abutment. It will be concrete lined and will be 475 feet long, including the stilling basin. It will be controlled by two radial gates 50 feet long and 21 feet high.

The Percha Arroyo diversion dam will be of construction similar to Caballo Dam. It will be 25 feet high and 2400 feet long. The canal which will lead the water from Percha Arroyo to the Caballo reservoir will have a bottom width of 50 feet and will be 2900 feet long.

250,000,000 Tires

THE completion of a quarter billion tires during the 38 years of its existence was recently announced by the Goodyear Tire & Rubber Company. The unit which marked this milestone was one of the company's new "super" tires for lower-priced passenger cars.

It is hard to realize what is represented by the number of tires involved in Goodyear's production without using some "yardsticks" for comparison. Stacked one on top of the other, the tires would reach a height of 17,750 miles. Laid side by side, they would encircle the globe more than four and one-half times, or stretch nearly one-half the distance to the moon.

Converted into mileage, the 250,000,000 tires would equal 3,000,000,000,000 miles, or more than enough to make 60,000 round trips to the moon. If a single motorist, averaging 10,000 miles a year, attempted to wear out this enormous production, it would take 75,000,0000 years.

Manufacture of the tires consumed approximately 1,200,000,000 pounds of cotton, or 2,400,000 bales, and approximately 2,750,000,000 pounds of crude rubber, which on the present production schedule would amount to all the rubber the world could produce in a year and a half.

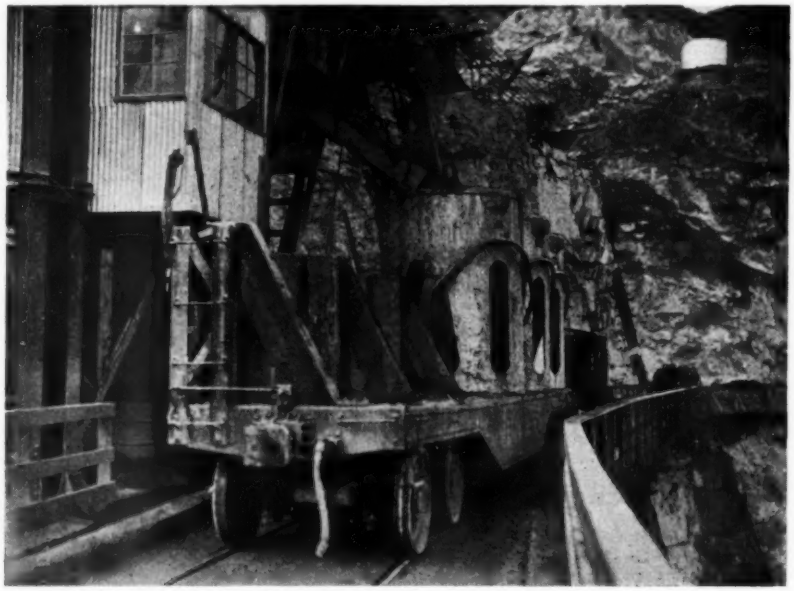
If the tires were placed in box cars, they would make up a train that would stretch over two-fifths the distance across the United States.

Wire Rope Firm Celebrates 60th Anniversary

IN 1876 the first plant of Broderick & Bascom Rope Company began operations in St. Louis, Missouri, the first concern to manufacture wire rope west of the Alleghany mountains. Its growth was rapid enough to warrant building of a new plant in 1883, and another in 1892.

As demand for wire rope grew with the development of the West Coast, the company built a manufacturing plant in Seattle, Washington.

Today, celebrating 60 years of business growth, Broderick & Bascom give as reason for their success a policy of youthful thinking. In the anniversary issue, the "Yellow Strand," company magazine, emphasizes the importance of youth, of receptiveness to new ideas, to an old company which must stay young to continue in existence.



• *One of the specially built flat-cars being loaded at the concrete mixing plant at the Grand Coulee Dam. The big plant is anchored to the sheer granite cliff behind the west Cofferdam area on the west bank of the Columbia. Trestles extend out over the bedrock which has been uncovered and where concrete has been poured since December 6. This train unit when loaded with five buckets similar to the three shown weighs 100 tons. Giant whirlies and cranes lift the buckets from the train on the trestle and lower them where the forms have been prepared for receiving the concrete.*

For your convenience in writing to the Bucyrus-Erie Co., you will find a card bound in this issue.

Tough Jobs Prove
there is a difference
in WIRE ROPE!

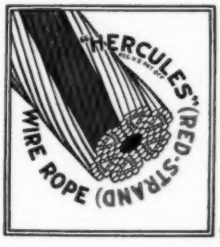
You excavating engineers know that when you run into hard pan, rocky ground, muck or quick sand, just any wire rope won't do. You know that you must have a tough rope to do a tough job. One that can stand up against the terrific punishment of a hard steady grind.

No matter what kind of job you are working on, there comes a time when you will need and appreciate the added durability and dependability of "HERCULES" (Red-Strand) Wire Rope—That extra margin of service built into this rope will more than pay you for the sound judgment you used in specifying it.

If you have a really tough job, where the wire rope must be durable to stand abuse . . . where it must be dependable to keep the job moving . . . where it must be economical to keep costs down, specify "HERCULES" (Red-Strand) Wire Rope. You'll notice the difference.

Quick Facts
about "HERCULES" [Red-Strand] Wire Rope

- **Acid Open-Hearth Steel** is used to make Leschen steel wire lines more uniformly dependable.
- **Rigid Wire Tests**—Every wire is rigidly tested to meet our exacting requirements.
- **Methods of Manufacturing**—Our 79 years rope making experience has taught us the most efficient methods of manufacturing.
- **Construction**—Made in a wide range of constructions to meet specific conditions.



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Digging by "Stame"

(Continued from page 298)

pullies, etc. to accomplish a very small affair, I never before beheld. One cannot fancy a more instructive instance of the vanity of attempting to do by machinery what machinery is incapable of doing—for there might have been ingenuity in the attempt, and there is none; but I defy anyone to point me out an instance of more miserable failure. It is but a spade after all; a spade for a giant it may be—some 'briarcus with a hundred arms;' but still a spade only, that can earn for its giant owner no more than is necessary for decent maintenance.

I am Sir,
Your Constant Reader,
PROBE."

In thus expressing opposition to the steam shovel it should be remembered that "Probe" was really voicing the opposition of a tremendous army of pick and shovel men known in England by the name of "Navigators," called for short "navvies." These men were designated navvies because, previous to the construction of railroads, they were largely used in excavating canals.

As late as 1848 one author estimated that "for some years to come the work to be done in England would require over 200,000 men per day."

"Those Banditti . . ."

These men appeared to have been much given to drinking and striking. One authority speaks of them as "those banditti known in some parts of England by the name of navvies or navigators and in other parts as "bankers."

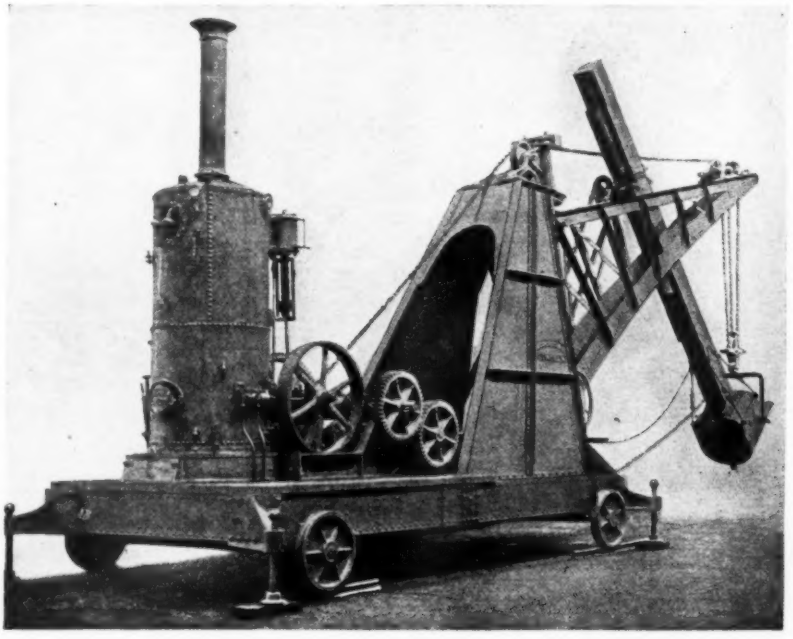
Since it is probable that this group of men in England was typical of those in other countries, the following description of them, taken from an English journal, should be of interest:

"The laborers who executed these formidable works were in many respects a remarkable class. The 'railway navvies,' as they were called, were men drawn by the attraction of good wages from all parts of the kingdom; and they were ready for any sort of hard work. Many of the laborers employed on the Liverpool line were Irish; others were from the Northumberland and Durham railways, where they had been accustomed to similar work; and some of the best came from the fen districts of Lincoln and Cambridge, where they had been trained to execute works of excavation and embankment. These old practitioners formed a nucleus of skilled manipulation and aptitude, which rendered them of indispensable utility in the immense undertakings of the period. Their expertness in all sorts of earth work, in embanking, boring, and well-sinking — and practical knowledge of the nature of soils and rocks, the tenacity of clays, and the porosity of certain stratifications—were very great; and, rough looking though they were, many of them were as important in their own department as the contractor or the engineer.

What the Well-Dressed Workmen Wore

"During the railway-making period the navvy wandered about from one public work to another — apparently belonging to no country and having no home. He usually wore a white felt hat with the brim turned up, a velveteen or jean square-tailed coat, a scarlet plush waistcoat with little black spots, and a bright colored kerchief round his herculean neck, when, as often happened, it was not left entirely bare. His corduroy breeches were retained in position by a leathern strap round the waist, and were tied and buttoned at the knee, displaying beneath a solid calf and foot encased in strong high-laced boots. Joining together in a "butty gang," some ten or twelve of these men would take a contract to cut out and remove so much "dirt"—fixing their price according to the character of the "stuff," and the distance to which it had to be wheeled and tipped.

"The contract taken, every man put himself to his mettle; if any was found skulking, or not putting forth his full working power, he was ejected from the gang. Their powers of endurance were extraordinary. In times of emergency they would work for twelve or even sixteen hours, with only short intervals for meals. The quantity of flesh meat which they consumed was something enormous; but it was to their bones and muscles what coke is to the locomotive—the means of keep-



• *Dunbar & Ruston patented this shovel in 1876. Like the Chaplin machine, the revolving machinery is at the base of the mast, which has been strengthened here by metal plate braces.*

BUCYRUS-ERIE

1936 Performance

When you step onto the deck of one of the new Bucyrus-Erie shovels you realize at once that here is something startlingly different in modern heavy-duty excavators. You are impressed with the smoothness of perfect control, the ease with which the machine eats through hard digging, the symmetry and simplicity of the rugged design. Let us show you what a 1936 model Bucyrus-Erie can do to increase your profits.

● Illustrated: 5-yard 85-B coal loader in pit of Pyramid Coal Corporation at Pinckneyville, Illinois.

147

BUCYRUS ERIE

EXCAVATING, DRILLING, AND MATERIAL HANDLING EQUIPMENT... SOUTH MILWAUKEE, WISCONSIN, U.S.A.

For your convenience in writing to the Bucyrus-Erie Co., you will find a card bound in this issue.

ing up the steam. They displayed great pluck and seemed to disregard peril. Indeed the most dangerous sort of labour—such as working horse-barrow runs, in which accidents are of constant occurrence — has always been most in request amongst them, the danger seeming to be one of its chief recommendations.

"Working together, eating, drinking, and sleeping together, and daily exposed to the same influences, the railway laborers soon presented a distinct and well-defined character, strongly marking them from the population of the districts in which they laboured.

"Reckless alike of their lives as of their earnings, the navvies worked hard and lived hard. For their lodging, a hut or turf would content them; and, in the hours of leisure, the meanest public-house would serve for their parlor. Unburdened, as they usually were, by domestic ties, unsoftened by family affection, and without much moral training, the navvies came to be distinguished by savage manners, which contrasted strangely with those of the surrounding population. Yet, ignorant and violent though they might be, they were usually good-hearted fellows in the main — frank and open-handed with their comrades, and ready to share their last penny with those in distress. Their pay-nights were often a saturnalia of riot and disorder, dreaded by the inhabitants of the villages along the line of works.

"See the English, How They Work!"

In illustration of the extraordinary working energy and powers of endurance of the English navvies, we may mention that when railway-making extended to France, the English contractors for the works took with them gangs of English navvies, with the usual plant, which included wheelbarrows. These the English navvy was accustomed to runout continuously, loaded with some three or four hundredweight of stuff, piled so high that he could barely see, over the summit of the load, the gang-board along which he wheeled his barrow, whereas the French navvy was contented with half the weight. Indeed, the French navvies on one occasion struck work because of the size of the English barrows, and the strike was only quelled by the aid of the military. The consequence was that the big barrows were abandoned to the English workmen, who earned nearly double the wages of the Frenchmen.

The manner in which they stood to their work was matter of great surprise and wonderment to the French country people, who came crowding round them in their blouses, and after gazing admiringly at their expert handling of the pick and mattock, and the immense loads of "dirt" which they wheeled out, would exclaim to each other, "Mon Dieu, voila! Voila ces Anglais comme ils travaillent!"

In the biography of Wm. S. Otis published on page 181 of the April issue of Excavating Engineer, it was incorrectly stated that John D. Dunbar married a third daughter of Deacon Leonard Everett. He married Helen Otis, daughter of Wm. S. and Elizabeth Otis. We are indebted to W. O. Dunbar for the correction.

Not As Complicated As It Looks

At a meeting of the Institution of Civil Engineers in 1845, J. B. Hyde described the Otis shovel and at the same time exhibited a model of a shovel or dredge in which he had incorporated certain improvements. Mr. Hyde said:

"At the first view, the machine appears complicated; but it is not so in reality. Still it is probable some of the arrangements may be simplified, as the machine has remained much as it was originally constructed for Messrs. Carmichael, Fairbanks, and Otis, eminent railroad contractors in the United States, who were driven to the invention of some method of rendering themselves independent of their workmen, who by constant striking, prevented the completion of the contracts undertaken by their employers.

"The trials of the Excavator on the Eastern Counties Railway were made under very disadvantageous circumstances; the workmen were inexperienced, the form of the shovel was not adapted to the nature of the material to be excavated, and so few wagons were provided, that frequent stoppages occurred, from the inability to carry away the earth as fast as it could be dug up; yet in spite of these drawbacks, the machine has delivered as much as 100 cubic yards per hour, and the cost of working it, including fuel, wages, wear and tear and interest of capital, did not exceed fifty shillings per day.

"The machine is locomotive and has besides three kinds of motion, viz., the thrusting the shovel, the lifting it by the main chain when filled with earth, and the turning round on its centre, to deposit the material raised in the wagons, placed in a convenient position near it. The shovel when lowered, may be brought direct to the front frame of the machine, when it will be at an angle of about 40, or it may be worked horizontally directly in front, or made to scrape along each side, as the nature of the cutting demands. The motions are under perfect control by the lever of the machine, and the whole machine travels upon temporary rails laid for it.

"The excavator has been tried in America against a chain and bucket dredging machine and has been found much more economical in every respect, doing more work in a given time, at a less expense, and more satisfactorily."

The "American Devil"

The next record found of this Otis shovel is in the Newcastle "England" Advertiser during the year 1846.

"The American Excavator—A steam excavating machine, upon which the laborers have bestowed the name of the 'American Devil,' is now being employed at Hull in excavating the Victoria Dock. It was invented about eight years ago by a gentleman of New York and has been extensively used in the formation of American railways. It consists of a portable steam engine of about 16 h.p. and it is provided with a crane to which is attached a large square bucket of wood, armed with 6

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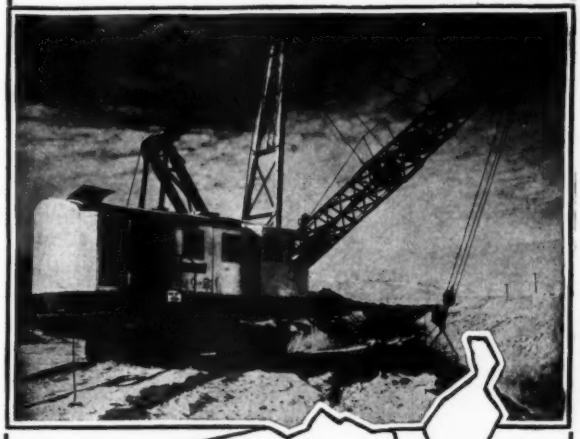

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tusks. These tusks pierce the earth, which at once fills the bucket, two buckets filling an earth wagon. The machine requires 2 engineers and 3 men, and does the work of 30 men; filling about 200 wagons per day, each wagon containing about 7 tons of earth."

John Duncan, to whom reference has already been made, was granted an English patent for the Otis steam shovel on March 4, 1842, patent No. 9281. One of the drawings which accompanied his patent is shown on page 297. It should be noted that this conforms in every detail to the drawing made by Mason in 1841. It is fair to suppose that Duncan was granted permission by Otis to take out this patent. It is not known whether the drawings accompanying Duncan's application were reproductions of the drawings from which the American machines were built or whether they were made from measurements taken from the machine in England.

A Penny a Yard

An authority says that "In two months the shovel worked a total of 37 days of 12 hours each, average 838 loads per day of 1¼ cu. yds. It would require 180 men to excavate the same amount of material by pick and shovels. The machine costs about 1000 pounds and the cost of excavating by this means are:

	L	S	d
2 engineers	0	10	0
1 man to tend to the water	0	4	0
Coke, 8 or 10 cwt.	0	10	0
Wear and tear	0	10	0
Investment 10%	0	5	6
Contingencies	0	5	0
	2	6	6

or at 1000 cubic yards per day equals about ½ d. per cubic yard." This represents about one cent in American money.

The same authority states that he measured the dipper and found it to be 4' wide x 5'6" long x 3'6" deep — one of these measurements evidently included the distance that the dipper teeth projected beyond the bucket. He goes on to state that the shovel could dig forward a distance of 10' without being moved, and he calculated its crowding capacity to be equal to 40 horsepower.

England Slow to Manufacture Shovels

England followed in the footsteps of the United States in slighting this money maker and road builder, in fact she was worse, for it was not until after some of Chapman's machines were imported about 1870 that her manufacturers began production.

Ruston-Proctor and Company had made about 17 shovels, 3 of 8 and 14 of 10 h.p. before the end of 1877. These shovels were supposed to be employed only for excavating sand, silt, loose shale and soft clay, because when one was needed in 1877 for "digging in stiff brown clay" certain changes were deemed necessary to strengthen the machine and it was then constructed as shown on page 312. It will be noted as far as later practice was concerned that this machine had approximately the same track gauge as the Chapman or Souther machines.

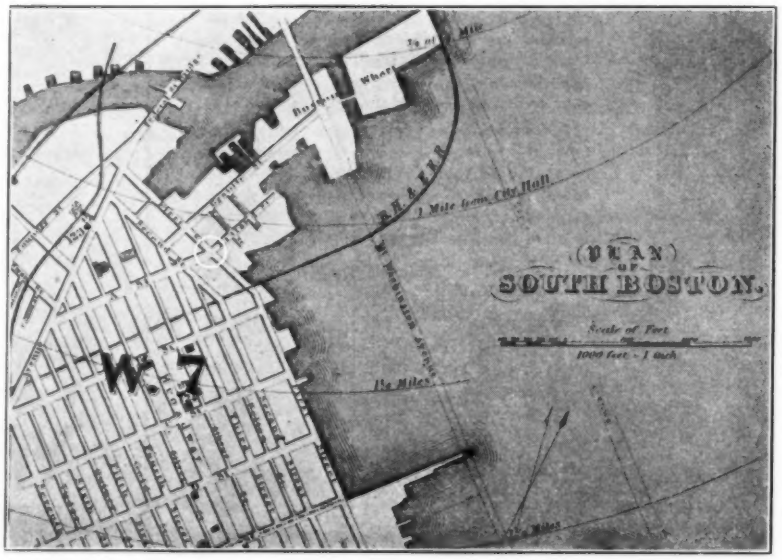
The steam shovel made by Alexander Chaplin and Company was very similar to the Ruston machine, as can be seen by referring to page 298. This illustration is one of their earliest machines which was built "for tirring off the strata overlying limestone in a quarry."

Before closing these remarks about England, it is interesting to note that patent No. 4480 taken out by Dunbar and Ruston in 1875 also covered patents on the first shovel of the revolving type, illustrated on page 297. It was however 10 or 15 years later before full revolving shovels were built in England or America.

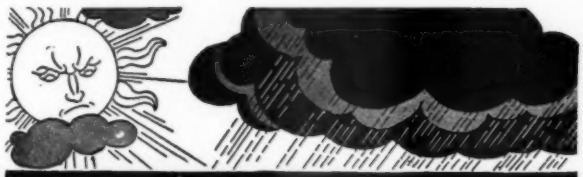
Shovel Building Enters Second Stage

O. S. Chapman married the widow of Otis in 1845. Chapman had been a successful railroad contractor. He was with Otis when he conceived the idea of a steam shovel at Canton, Mass. in 1835. He had also later been associated with Carmichael, who owned the original shovels, in building other railroads and realized full well their labor saving value. He doubtless prompted his wife to apply for an extension of Otis' patent in 1853; later in 1867 he, too, was granted a patent No. 63857 on "certain improvements to the Otis shovel".

Some time during this period Chapman began to have the shovels made by the Globe Iron Works, later the John Souther Company, of Boston using the original Otis construction. The date is very uncertain because these later shovels were both ad-



• *Indicated by the white circle in the location of the Southeren plant in Boston where Chapman had his shovels built.*



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GRADE 19 - A heavy, waterproof grease for open gears, especially under heavy pressures.

GRADE D51 - For power shovel or other open gears where dusty or dirty conditions prevail.

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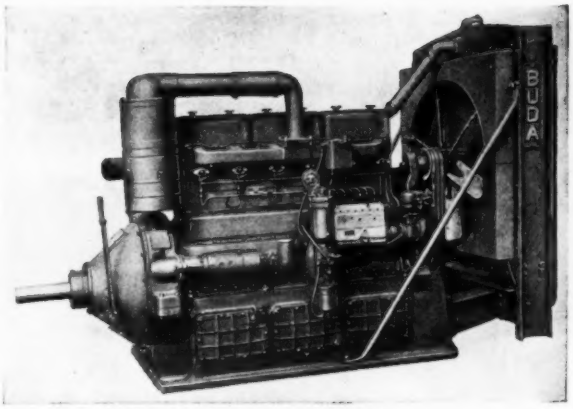

The new Buda-Lanova Diesel Model 6-LD-909 . . . a 6-cylinder, 4-cycle, solid injection engine; 5½ x 7 in., 909 cu. in.; 178 hp. at 1500 rpm, 156 hp. at 1200 rpm.

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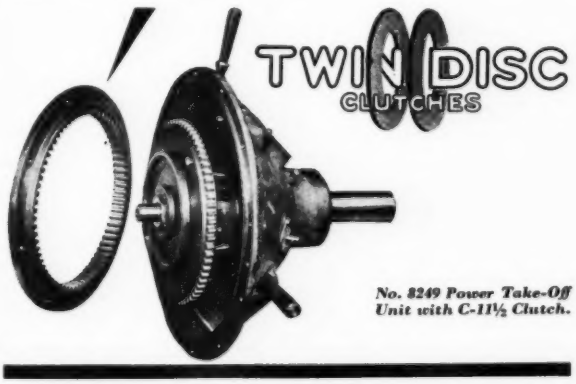
Like other Buda Engines, the latest addition to the industrial line, the "909" 6-cylinder Buda-Lanova Diesel, is Twin Disc equipped.

And the reason is—"While the use of the Twin Disc Clutch *did* enable us to simplify the design and construction of this unit, as well as others * * * the Buda Company has *standardized* on Twin Disc Clutches *primarily* because of the reputation of this clutch."

It took nineteen years of specialized experience and engineering research to build that reputation. The makers of Twin Disc Clutches intend to keep it. *Write* for specific recommendations on your clutch problem. Engineering data on request. *Twin Disc Clutch Company, 1335 Racine Street, Racine, Wisconsin.*



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THE LA CROSSE TU-WAY

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Trailers of all types and up to any capacity.

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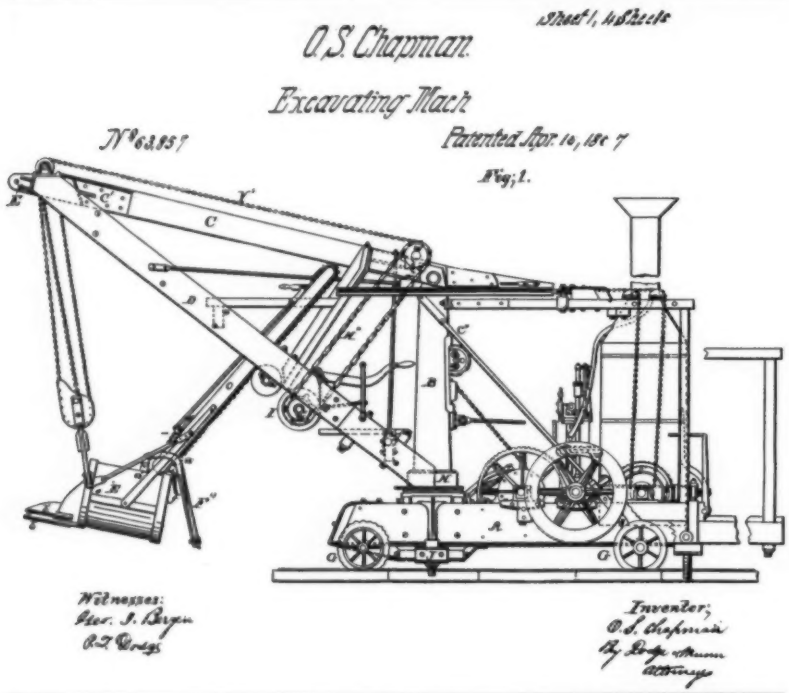


• This copy of Chapman's patent drawing of 1867 shows plainly the "chain crowd," probably one of Chapman's principal improvements to the Otis machine.

vertised and referred to as the Otis shovel, although as time went on they were also designated as the Otis-Chapman, or the Chapman-Souther shovels. It is difficult to tell therefore, when a contractor writes, as one did in 1876, "I have used the Otis steam excavator for the past 20 years", or another in 1885 that he "has been handling the Otis machine for the last 30 years", whether they are referring to one of the two original shovels or those made later at Boston.

60 Years of the Same Design

The first advertisement of shovels made by the Globe Iron Works appeared in 1860, so it would be fair to assume the second period of their manufacture began in the '50s. Strange to relate, although these shovels continued to be built until 1912 or 1913, there were no radical changes in their design. (It is interesting to compare this with the changes which have taken place in the last 10 years.) They retained the same mechanism for swinging the boom, although two or three new types of dippers had been added.

The shovel was really fortunate in having a man like Chapman as its champion. He had made "his pile" as a contractor and was fully able to market the shovel, as his "sales talk" was based on the actual use of it.

"The Power of Two Horses"

Jason C. Osgood of Troy, New York, was a builder of dredges, of the bucket type. In 1842 he met Carmichael and probably for the first time saw an Otis shovel. They conceived the idea of a dredge equipped with a boom and dipper similar to the Otis. They were granted a patent No. 4547 in 1846 covering "A certain new and useful improvement in the manner of constructing and working the machine for excavating and removing earth invented by Wm. S. Otis". Their design indicates, however, the application to a dredge, indeed this is borne out by the fact that they contemplated a difficulty in procuring fuel because of the use of the machine on water, and intended using "the power of two horses instead of steam".

The only other competitor of the Otis-Chapman-Souther shovel previous to 1880 was the Alger Patent Friction Excavator made by the Vulcan Iron Works Company at Oswego, N. Y. No shovels built by this company previous to 1880 have been located.

John King Co. of Oswego, N. Y. built a shovel known as the "Oswego" or the "Oswego Boom Machine" for its patentees, C. H. Sage and S. A. Alger. This shovel was patented in November 1870. An article published in April 1871 states that several were then at work in excavations. However, this shovel was short lived because the dipper stick was hinged to the boom.

Nine American Shovels to Panama

In February 1880, De Lesseps came to the United States from Panama to secure further financing for his project. While here he heard of the steam shovels built by Osgood and Chapman and was so impressed that one of each make was ordered. Later, seven more of the Osgood make were purchased after trial and test. De Lesseps had taken to Panama excavators of the European type. While the French technical writers were prejudiced to their form of excavator, the American shovels proved superior.

The following is quoted from a French journal:

"A characteristic in favor of the Osgood is that its enormous bucket permits it to take up the great blocks of rock that are found scattered in certain types of ground. The American contractors assert that their apparatus can produce two bucket loads per minute. It would be very much to be desired that the practical service per day attained to one-half of this amount".

A copy of Otis' restored patent application drawing, hitherto believed lost; an account in Otis' handwriting of a day's expenses of his shovel; and the story of early shovel operations on the C.B.&Q. will feature next month's installment of this history.

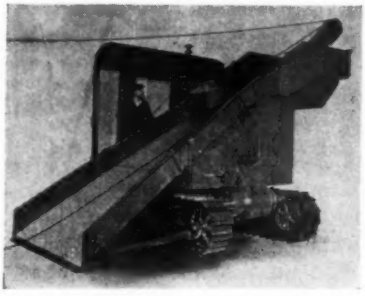
Boss: Say, what does this mean? Someone called up, said that you were sick and you couldn't show up today.

Shovel Runner: Ha! Ha! The joke's on him. He wasn't supposed to call up until next Friday.

EQUIPMENT *You Ought to Know About*

(*Continued from page 293*)

trol the scraper and the other two control the steering and travel of the machine. When moving to a new location, the scraper bucket is drawn to the top of the ramp and the lower apron of the ramp is raised clear of the ground.

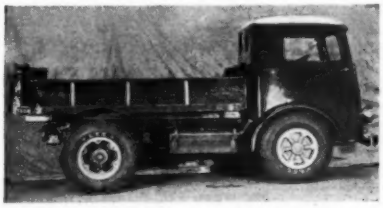


Sauerman scraper-loaders are offered in four sizes, equipped with Crescent scraper buckets of ½, ¾, 1 and 1½ cu. yd. capacities. The operating spans range from 200 ft. for the ½-yd. machine to 400 ft. for the 1½-yd. unit.

New Traffic Type Macks

TWO NEW traffic-type truck models were recently announced by Mack Trucks, Inc. Known as the EC and EB, through their condensed forward construction, the new models in each case save three feet in length over the corresponding models, besides providing one-third, two-thirds gross weight distribution.

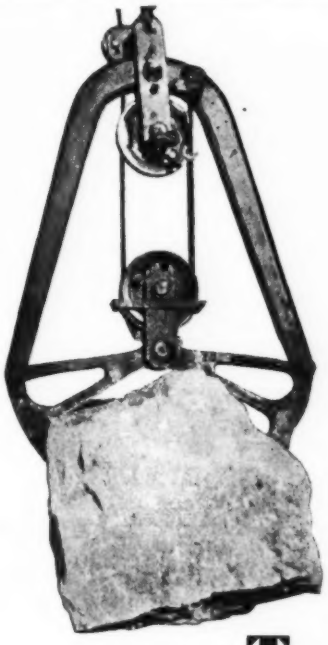
The cabs of the new models are modernly styled. Roof is of all-

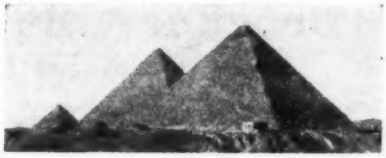


metal construction and is built integral with the cab. The driver's seat is easily adjustable and has been built for comfort and long life. In addition to the ventilating windshields and the drop windows in the doors, the front sheet is fitted with two large door-type hatch ventilators, located on either side of the radiator grills. There are two fixed back windows in the cabs to provide maximum rear vision.

Located between the floorboard and the seats, the engine is heat-tight, sound-proof and gas-proof. The new models are powered by six-cylinder engines, the EC engine having a 3⅝ by 5 bore and stroke and developing 79 horsepower at a governed speed of 2,300 r.p.m., while the 3⅞ by 5 EB engine produces 92 horsepower at the same governed speed. These engines are of the L-head type with block-cast cylinders and a deep-section integral crankcase of heat-treated chrome-nickel.

Actuated by a powerful and positive vacuum booster, the four-wheel foot brakes are of the straight mechanical type and operate on drums of special chrome-nickel alloy iron. Foot brake areas of 427 and 431 square inches provide ample braking. For complete data and prices write to Mack Trucks, Inc., 25 Broadway, New York or see your nearest Mack factory branch. Please mention Excavating Engineer.





The men who built the Pyramids died like flies.

Thousands of slaves, building the ancient Pyramids, died like flies, transporting huge blocks of stone across deserts and up steep inclines. It took an army of men several decades to build the Great Pyramid said to contain 2,300,000 blocks each weighing about 3 tons. This difficult task was accomplished with the aid of crude ropes, levers and rollers. Compare this handling with present day methods. Surely, today's ways are a boon to man and industry.

TODAY you cannot compare the Bucyrus-Erie Rock Grab with ancient handling methods or any other grab you may have seen or heard about. This new unit will save time and expense on any job where large pieces of rock must be lifted. It operates safely, easily, simply . . . picking up, carrying and setting down heavy weights as easily as you would pick up a pencil. Find out about the Rock Grab. Users say it is indispensable. Five sizes—2½, 5, 10, 15, and 20 Ton capacities.

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• *This "broad" view of the Lewis-Chambers' job gives a good idea of the usefulness of the 230-B's long reach.*

Draglines Dig Atlantic-Gulf Ship Canal

(Continued from page 292)

The minimum for skilled labor on the job, such as dragline operators, electricians, mechanics, blacksmiths, etc., is 75 cents per hour.

Government specifications require that 10 per cent skilled labor, including administrative men, may be used to 90 per cent relief labor. These restrictions are rigidly adhered to, and government inspectors are required to see that no violations are permitted. Promotion or demotion may be made without referring back to the U. S. Employment Office through which all labor must be hired. Except for the 10 per cent mentioned above, all labor comes from Florida relief rolls.

Dirt can be moved by machinery only in proportion to the relief labor used.

H. M. Dunn, chief U. S. inspector on Items 27 and 28, of the Operations Division, United States Engineers, furnished the exact specifications and plan of calculating the work of man in ratio to machine.

The government specifications are:

"The contractor shall plan his work and the use of his machinery and equipment on the same, so as to provide the equivalent of one man-year of employment for each $1,000 of the total amount to be paid under the contract."

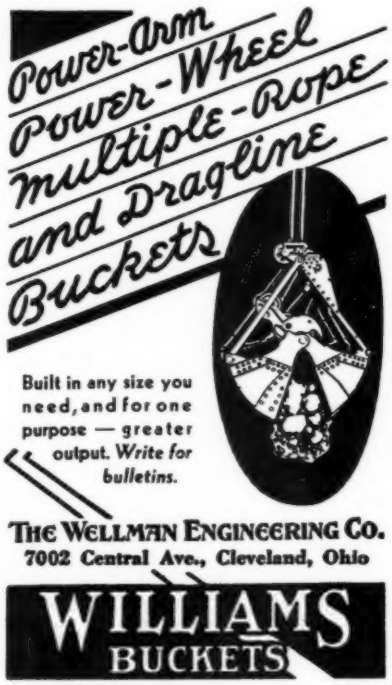
Mr. Dunn said that one man-year was figured at 1500 hours.

Since Brooks-Callaway sublet Items 27 and 28 from Geo. D. Auchter, the latter is required to have a superintendent on the sublet contract. He transmits government instructions and other business to the sub-contractor. This man is I. W. Shumaker, superintendent for George D. Auchter Company. Superintendent for the Brooks-Callaway Company, is C. F. Myers, and H. C. Gleason is assistant superintendent.

Government men on the project are H. M. Dunn, chief U. S. inspector and John H. Ringeling, assistant. Among their duties is to keep a record of the labor, and their records show that 350 men are employed on the two projects, 320 of whom were recruited from various sections of Florida, and were formerly on relief rolls. Work is limited to 8 hours per day and 40 hours per week. With the exception of about 20 men, all employees live at the Brooks-Callaway camp, where board is furnished for $3.50 per week.

• *C. F. Myers, Brooks-Callaway superintendent, left, and his assistant, H. C. Gleason.*

The Brooks-Callaway Company is one of the oldest construction companies in the south. Its officers are B. E. Brooks, president and J. L. Brooks, vice president and S. H. Rumph secretary and treasurer. Headquarters are at Atlanta. Previous to accepting this contract, the company was engaged in levy work on the Mississippi, they have been in the contracting business for more than 50 years and own and operate more than $700,000 worth of machinery.



Book Reviews

A new motor grader bulletin entitled **"Judge Motor Graders At The Blade"** has just been released by the **Austin-Western Road Machinery Company**, of Aurora, Illinois.

The bulletins lists the four things that the machine must do in order to perform successfully on every type of motor grader work. These four operations are: (1) the blade of a motor grader must move a full load over any surface; (2) the motor grader must have complete front end control; (3) the operator must have positive and instant control over every operating part; (4) he must have absolute control over the blade for smooth, even cut.

LeTourneau Carryalls are described in a new 16-page illustrated booklet. Action photographs show the Carryall scrapers at work on various jobs, detailed drawings illustrate loading, hauling, dumping, and spreading. Specifications and important construction characteristices are given. Also described are other units of road machinery including bulldozer, angledozer, rooter and cradle dump buggy. Copies of the booklet may be obtained by writing R. G. Le Tourneau, Inc., Peoria, Illinois.

Pioneer Gravel Equipment Company, 1515 Central Avenue, N. E., Minneapolis, Minnesota recently issued a new booklet designed to aid in selection of proper type, size and design of crusher for various jobs. Anti-friction vs. bronze bearings are discussed, also the advantages of modern design and construction in jaw crushers. A chart gives the percentage of any size which a crusher will produce at various settings.

"Construction" is the title of a new booklet issued by **Allis-Chalmers Manufacturing Company.** It contains information on the entire line of road machinery manufactured by the company, including tractors, various types of graders, patrols, wagons, and power units. Machinery is illustrated, and specifications are given. The same company has also published recently a complete booklet about their Model K tractor. Copies of the two publications may be secured by writing to Allis-Chalmers Manufacturing Company, Milwaukee, Wisconsin.

Safety is the theme of an illustrated booklet recently published by the **Four Wheel Drive Auto Company**, Clintonville, Wisconsin. Statistics regarding 1935 highway accidents and their causes are graphically presented. Characteristics of the Four Wheel Drive Auto in view of these figures are discussed. Contractors operating trucks may secure copies of the booklet by writing to the manufacturer.

" 'Caterpillar' Auto Patrols, for Year 'Round Service' " is the title of a new catalog issued by **Caterpillar Tractor Company** of Peoria, Illinois. Products described are the Diesel No. 11 and No. 10, and the gasoline No. 11 and No. 10 Auto patrols. Technical points of interest to users of road machinery are fully discussed in a non-technical manner. Parts and assemblies are reproduced in large illustrations, and action photographs depict year-around uses of the machine. The manufacturer, or Caterpillar distributors will be glad to send you a copy.

Material-Handling Equipment — Jeffrey Manufacturing Company, Columbus, Ohio, have recently published a 64-page catalog, No. 610, covering material-handling electric vibrating equipment of the Jeffrey-Traylor type which has no mechanical wearing parts. The catalog contains specifications of the various types, and deals extensively with typical installations covering feeding, screening, conveying, packing, cooling, drying and other handling operations. A copy may be had by writing the manufacturer.

The 1936 catalog of the **Chain Belt Company** of Milwaukee, Wisconsin, illustrating the new Rex Moto-Mixers and Agitators is made up in eleven sections. Sections titles are: Profits; Background; Application; Users; Geography; Your Questions; Rex Answers; Sizes; Agitators; The Men; The Plant. Sections are illustrated and contain descriptive text.

POSITIONS WANTED

Positions wanted advertisements will be run under this heading for 5 cents per word, minimum charge $1.00. Advertisements for help wanted free of charge.

Address all box numbers c/o Excavating Engineer at South Milwaukee, Wisconsin

SHOVEL-DRAGLINE-CRANE OPERATOR

Experienced operator desires position on any type or size machine, preferably large electric. Has operated steam machines—7 years; electric—3 years; gasoline—3 years; Diesel—3 years. Machines operated include shovel (9 years), dragline (3 years), clamshell (1 year) and crane (3 years) on highway work, railroad construction and stripping. Can do own repair work. Age 36; single. Willing to go any place. Can furnish references. Now located near Harrisburg, Pa. Box 8101.

STEAM SHOVEL OPERATOR

Twenty years' experience on steam shovels on contracting and railroad work qualifies me to operate your steam machine. Age 44; married. References. Now located Southern Idaho. Box 8102

OPERATOR

12 years' experience on steam shovels, locomotives, cranes, clamshells. Can do own repairing. Willing to go anywhere. 30 years old and single. First class references. Now located in New York. Box 8106.

DRAGLINE OPERATOR

Operator experienced on levee, revetment and drainage work desires work on Bucyrus-Erie steamer, any size. Seventeen years on dragline, two on clamshell and one on crane. One year each on gasoline and Diesel machines. Can do own repair work. Will go anywhere in U. S. Age 36; married. A-1 references furnished. Located in Missouri. Box 8107.

SHOVEL-DRAGLINE OPERATOR

Experienced shovel and dragline operator, 10 years on gasoline and Diesel machines on highway, railroad, mining, power dam and river work desires position on railroad or dam construction operating gas or Diesel machine any size. Can operate dredge. Willing to go anywhere. Age 34; married. Can do own repair work. A-1 references. At present located Upper Michigan. Box 8104.

STEAM SHOVEL OPERATOR

Have 25 years' experience on steam machines on all kinds of construction work. Desire position on any make, size or type steam shovel; anywhere. Can do own repair work. Best references furnished. Age 50. Married. At present located in Missouri. Write Box 8105.

DRAGLINE OPERATOR

Operator having 20 years' experience—eight years on shovel, ten years on dragline and two on clamshell—desires work on dragline, preferably gas or electric. Experience includes work on levee building, railroad construction, drainage ditches and in quarry. Can do own repair work. Age 42; married. Willing to go anywhere for steady work. Best of references. Located Southern Ohio. Box 8003

DRAGLINE OPERATOR

Dragline operator who has 13 years' experience on levee and ditch work desires position on Bucyrus or Monighan, gas or Diesel power, any size. Operated Diesel machine 7 years; gas-6 years. Willing to go anywhere. Can do own repair work. References furnished. Age 44; married. Now located in Ohio. Box 7903.

EXPERIENCED OPERATOR

Dragline and Shovel operator having 9 years experience desires position operating machine on road building, sewer, canal or drainage excavation. Prefers 3 or 4 yard Diesel dragline, having 5 years experience on Diesel powered machines and 4 years on gas machines. Has operated dragline 5 years, shovel, 2 years, clamshell, 1 year, and crane, 1 year. Age 31; married. Can do own repair work. Best references. Willing to go anywhere. Now located in Illinois. Box 7902.

DIESEL OPERATOR

Sixteen years experience on shovels, draglines and clamshell-cranes—seven years on Diesel powered machines—on drainage work and dam construction are my qualifications. Have also operated steam and gasoline powered excavators. Prefer position on Bucyrus or Monighan steam or Diesel dragline or crane; capacity 1 to 6 cubic yards. Willing to go any place. Can do own repair work. Age 33; married. Can furnish good references. At present located northwestern Ohio. Box 8005.

DRAGLINE OPERATOR

Operator experienced on levee, revetment and drainage work desires work on Bucyrus-Erie steamer, any size. Seventeen years on dragline, two on clamshell and one on crane. One year each on gasoline and Diesel machines. Can do own repair work. Will go anywhere in U. S. Age 36; married. A-1 references furnished. Located near Memphis. Box 8004.

SHOVEL OPERATOR

Operator—10 years' experience on shovel, dragline and clamshell—on general excavation and mining—desires work on any make and type machine. Can do own repair work. Will go anywhere. Age 40; single. Best of references. Present location near Chicago. Box 8001

DRAGLINE OPERATOR

Experienced crane and dragline operator wishes work preferably on Bucyrus dragline or piledriver. Has operated steam and gasoline machines for 15 years. Willing to go anywhere in U. S. Can do own repair work. Age 39; married. Good references. Located near Chicago. Box 8002

EXPERIENCED OPERATOR

Experienced shovel-dragline-crane - clamshell operator desires work anywhere, preferably in foreign country. Twenty years' experience includes work on gas, electric, Diesel and steam machines. Can do own repair work. Best of references. Present location West Virginia. Box 8006.

EXCAVATING ENGINEER Bargain Counter

★ ★ ★ THE ITEMS LISTED on these pages have been selected because they offer unusual values to the man who is looking for a bargain. Some of this equipment is surplus stock which has never been used, some is rebuilt and carries new equipment guarantee, some is just plain used. But every item is priced for quick sale. If any of this equipment fits your needs send a postcard or letter, mentioning the reference number, to *Bargain Counter, Excavating Engineer, South Milwaukee, Wisconsin.* We'll pass your inquiry along to the owner and you will receive price and complete information promptly. Act now — with advancing prices on new stock this equipment will move fast.

COMPLETE FRONT END EQUIPMENT

Shovel Equipment

½ CU. YD. DIPPER, 16' boom, 13'8" dipper handle. Shovel equipment suitable for type "A" shovel. NEW. SE-39.

⅝ CU. YD. DIPPER, 12'6" dipper handle, 16' boom. Shovel equipment suitable for type "A" shovel. NEW. SE-31.

¾ CU. YD. DIPPER—23' BOOM—12'6" DIPPER HANDLE—Shovel Equipment suitable for 20-B Gas or Diesel. NEW. SE-15.

¾ CU. YD. DIPPER 25'9" BOOM—14' DIPPER HANDLE—Shovel Equipment suitable for 30-B Diesel. NEW. SE-17.

¾ CU. YD. DIPPER—20'6" BOOM, 17' DIPPER HANDLE, high lift shovel equipment suitable for 20-B steam. NEW. SE-32.

⅞ CU. YD. DIPPER—21'9" BOOM and ENGINE — 15' DIPPER HANDLE — High Lift Shovel Equipment. Suitable for 31-B Steam. NEW. SE-18.

1 1 CU. YD. DIPPER—26' boom, 17' handle Shovel equipment—Will fit 30-B. SE-35.

1¼ CU. YD. DIPPER — 25' BOOM — 17' DIPPER HANDLE — Slightly Used Rope Crowd High Lift Shovel Equipment suitable for Model 87-B. New Machine Guarantee. SE-5.

1½ CU. YD. DIPPER—27' BOOM—17' DIPPER HANDLE—High Lift Rope Crowd Shovel Equipment suitable only for Bucyrus-Erie 43-B machines. Rebuilt—New Machine Guarantee. SE-23.

1 1¾ CU. YD. DIPPER, 30' boom, 19' handle, high lift steam shovel equipment—Will fit 50-B. New. SE-33.

1 1¾ CU. YD. DIPPER, 22' boom, 16' handle, shovel equipment—Will fit 43-B. New. SE-34.

Skimmer Scoop

⅝ CU. YD. DIPPER—20' Boom together with all necessary ropes and material to completely convert Bucyrus-Erie 1020 Shovel, Clamshell or Dragline to Skimmer Scoop Machine. NEW. Shipment 2 to 3 weeks. SS-1.

Dragline Equipment

40' CHANNEL BOOM, FAIRLEAD AND ROPES, but not including bucket. For use on Model D-2—20-B—31-B. Used. DL-3.

BRAND NEW Ropes included with each of above Complete Equipments.

Trench Digging Equipment

1 CU. YD. 42½" WIDE—Solid type Dipper—24' Boom and all auxiliary equipment. Will dig maximum depth 22'. For application to GA-2 or GA-3 Shovel. Rebuilt—New Machine Guarantee. DS-5.

BRAND NEW PAGE, two dippers each ⅞ cu. yd., one 38" wide over cutters, the other 49½" wide over cutters. 17'1½" Boom and all necessary auxiliary equipment. Will fit Bucyrus-Erie 1030 or 1035. DS-7.

1-CU. YD. 42½" WIDE SOLID TYPE DIPPER—24' Boom and all auxiliary equipment—will dig maximum depth of 22'—For application to GA-2 or GA-3 Clam Shell or Drag Line. Rebuilt—New Machine Guarantee. DS-8.

BRAND NEW Ropes included with each of above Trench Digging Equipments.

DIPPER HANDLES

1	7'6" 1030 TUNNEL—Complete. New.	H-1.
1	7'10½" 20-B TUNNEL (two sticks). New.	H-2.
1	9'0" 31-B TUNNEL (two sticks). New.	H-3.
3	9'6" 30-B TUNNEL (two sticks each). New.	H-4.
1	9'6" 20-B TUNNEL (two sticks). New.	H-5.
1	9'6" 31-B TUNNEL (two sticks). New.	H-6.
1	12 0" 18-B—Complete. New.	H-7.
1	12'6" D-2, 31-B—Complete. New.	H-8.
1	12'6" D-2, 31-B—Complete. New.	H-9.
1	13'0" 1020—Complete. New.	H-10.
3	15'0" E-2 41-B—Complete. New.	H-13.
1	16'0" TYPE "A"—Complete. New.	H-16.
2	16'0"—43-B—Complete. New.	H-17.
1	17'0"—TYPE "A"—Complete. New.	H-18.
1	17'0"—20-B HIGH LIFT—Complete. New.	H-19.
1	17'0"—37-B—Complete. Used.	H-21.
1	17'0"—50-B OIL (two sticks). New.	H-23.
1	19'6"—37-B—Complete. New.	H-25.

BOOMS

1—15'0" 1030 CHAIN CROWD SHOVEL BOOM—Used. JA-32

4—18' 20-B STEAM SHOVEL BOOM—New. JA-2.

1—18' 31-B STEAM SHOVEL BOOM—New. JA-3.

1—20'0" 1020 ROPE CROWD SHOVEL BOOM—New. JA-23.

1—20'0" 1020 ROPE CROWD SHOVEL BOOM—New. JA-33.

1—20'0" 1030 CHAIN CROWD SHOVEL BOOM—New. JA-24.

2—20'6" 20-B STEAM SHOVEL BOOM—New. JA-4.

1—21' 3" Type "B" Bar Boom—New. JA-37.

1—21'6" 37-B CHAIN CROWD SHOVEL BOOM—New. JA-26.

1—21'9" 31-B STEAM SHOVEL BOOM—New. JA-5.

2—22'0" 43-B CHAIN CROWD SHOVEL BOOM—Used. JA-27.

2—23' 20-B DIESEL, GAS OR ELECTRIC SHOVEL BOOM—New. JA-7.

1—23'6" 37-B ROPE CROWD SHOVEL BOOM—New. JA-28.

1—24'0" 43-B ROPE CROWD SHOVEL Boom—New. JA-29.

1—24'0" GA-2 DRAG SHOVEL BOOM—New. JA-30.

1—24'0" GA-2 DRAG SHOVEL BOOM—Used. JA-34.

1—24'0" GA-3 DRAG SHOVEL BOOM—New. JA-35.

1—24' GA-2 or GA-3 SHOVEL BOOM—New. JA-8.

2—24' 43-B ROPE CROWD SHOVEL BOOM—New. JA-9.

1—25'8" 37-B ROPE CROWD SHOVEL BOOM—Used. JA-36.

1—25'9" 30-B DIESEL SHOVEL BOOM—New. JA-10.

1—26' 20-B DIESEL SHOVEL BOOM—New. JA-11.

2—26' D-2 SHOVEL BOOM—New. JA-13.

1—26' 50-B STEAM SHOVEL BOOM—New. JA-15.

3—27' 43-B ROPE CROWD SHOVEL BOOM—New. JA-16.

1—27'0" 43-B ROPE CROWD SHOVEL BOOM—New. JA-31.

1—30' 50-B ELECTRIC SHOVEL BOOM—New. JA-17.

3—30' 50-B STEAM SHOVEL BOOM—New. JA-18.

1—40' 20-B, 31-B and D-2 DRAGLINE BOOM—Used. JA-20.

DIPPERS

Small Machines

3 ½ CU. YD.—Plate Front—Will fit 1020 Drag Shovel. New. D-45.

2 ⅝ CU. YD.—Plate Front—Will fit 20-B. New. D-12.

1 2/3 CU. YD.—Plate Front—Will fit 14-B. New. D-13.

1 ¾ CU. YD.—Rock Type—Will fit 20-B New. D-67.

1 ⅞ CU. YD.—Ins. Tooth—Will fit 1030. New. D-47.

1 1 CU. YD.—Plate Front—Will fit 20-B. New. D-42.

1 1 CU. YD.—Manganese—Will fit B-2 and GA-2. Good condition. Used. D-40.

1 1 CU. YD.—Rock Type—Will fit 1030 Tunnel Shovel. New. D-50.

2 1¼ CU. YD.—Ins. Tooth—Will fit 30-B, 41-B, 42-B, E-2. New. D-44.

1 1¼ CU. YD.—Cast Front—Will fit 30-B, 41-B, 42-B, E-2. Used. D-43.

1 1¼ CU. YD.—Rock Type—Will fit 30-B, 41-B, 42-B, E-2. Used. D-27.

1 1¼ CU. YD. — Ins. Tooth — Will fit 37-B. Used. D-52.

1 1¼ CU. YD. — Ins. Tooth — Will fit 37-B. Used. D-38.

1 1½ CU. YD.—Ins. Tooth—Will fit 42-B, 43-B. New. D-55.

1 1½ CU. YD.—Ins. Tooth—Will fit 43-B. Used. D-39.

3 1¾ CU. YD.—Ins. Tooth—Will fit 43-B. New. D-58.

1 ⅝ CU. YD. ROCK—Will fit 20-B. New. D-64.

1 1 CU. YD. PLATE FRONT—Will fit 30-B, 41-B, 42-B, E-2. New. D-65.

Large Machines

1 2 CU. YD.—Manganese—Will fit 43-B. New. D-62.

1 3 CU. YD.—2½" Molybdenum cast steel front, two part Van Port reversible teeth—Will fit 100-B, 68-C, 70-C. New. D-2.

1 3½ CU. YD.—2¾" nickel chrome steel front, two part Van Port reversible teeth—Will fit 88-C, 95-C, Class 80 Atlantic. New. D-3.

1 4 CU. YD.—2¾" Molybdenum cast steel front, two part reversible teeth. In good condition.—Will fit 100-C, 120-B. Used. D-4.

1 6 CU. YD.—Molybdenum steel front. Annealed cast steel back, two-part Reversible Van Port Teeth.—Will fit 200-B, 225-B and 320-B. New. D-11.

1 8 CU. YD.—Front Molybdenum steel, two part Van Port Reversible teeth. Slightly used but excellent condition.—Will fit 320-B. Used. D-6.

DIPPER TRIPS

1—30-B STEAM DIPPER TRIP—New. DT-1.

1—31-B STEAM DIPPER TRIP—New. DT-2.

7—50-B STEAM DIPPER TRIPS—New DT-4.

BUCKETS

Dragline

3 2 CU. YD.—PAGE CLASS "C". 5630 lbs. New. DB-4.

1 2 CU. YD.—BECO TYPE "U". 3650 lbs. Rebuilt. DB-12.

1 2 CU. YD.—BECO TYPE "X". 5300 lbs. New. DB-23.

2 2 CU. YD.—BECO HEAVY DUTY. 5400 lbs. New. DB-24.

3 2¼ CU. YD.—BECO TYPE "U". 3850 lbs. New. DB-13.

2 2½ CU. YD.—BECO TYPE "U". 4100 lbs. New. DB-14.

1 2½ CU. YD.—BECO HEAVY DUTY. 6500 lbs. Rebuilt. DB-9.

1 2½ CU. YD.—OMAHA—STD. 5400 lbs. Rebuilt. DB-10.

1 5 CU. YD.—BECO HEAVY DUTY. 12700 lbs. New. DB-28.

1 5 CU. YD.—MONIGHAN HEAVY DUTY. 12000 lbs. New. DB-16.

1 6 CU. YD.—MONIGHAN TYPE "W". 12500 lbs. New. DB-17.

1 7 CU. YD.—MONIGHAN TYPE "W". 1370 lbs. New DB-18.

Clamshell

1 2 CU. YD. TYPE PF WILLIAMS CLAM-SHELL BUCKET without teeth and counter-weight. CSB-1.

ELECTRICAL EQUIPMENT

90 H.P. MOTOR — GENERAL ELECTRIC — 3 phase, 25 cycle, 550 volt, 1500 RPM. NEW. EE-1.

5 KVA TRANSFORMER—GENERAL ELECTRIC—2200-3810 volt primary, 440-220 volt secondary—3 phase, 60 cycle, with cast iron tank and cover, including specially fastened bushings to prevent oil leakage. NEW. EE-4.

125 KW GENERATOR—WESTINGHOUSE—250 volts, 500 amperes, Direct current. 440 RPM. Includes two outboard bearings. NEW. EE-5.

TANKS

Water

5—260 GALLON 41⅞"x21"x6'4". No. 14 BW gauge steel plate. T-1.

2—200 GALLON 36½"x20 7/12"x6'3" high. Elliptical—¼" steel plates. T-2.

1—283 GALLON 54⅝"x17⅜"x6'4". ¼" Steel plates. T-3.

Oil

4—60 GALLON 11½"x18"x77" Elliptical Blue annealed copper alloy smooth plate. T-4.

6—25 GALLON 47¼" dia. 14" deep—12 Gauge Std. Blue annealed copper alloy steel. T-5.

1—294 GALLON 48"x21¼"x6'4". ¼" steel plates. T-6.

4—50 GALLON 60" dia. x 12" deep—No. 12 Gauge Std. blue annealed copper alloy. T-7.

Gasoline

1—44 GALLON 18" dia. 43" high—No. 14 Gauge U. S. Std. welded construction. T-8.

6—55 GALLON 30"x18½"x28½" 16 Gauge—U.S.S. Terne metal. (1 copper brazed and 5 soldered) T-9.

Air

2—5 CU FT.—16" dia. x 48" high—225 lb. working pressure A.S.M.E. Std. Tested to 340 lb. cold water test. T-10.

1—14 CU. FT.—21½" dia. x 77" high—200 lb. working pressure. Will pass inspection in Massachusetts and any Canadian Province. T-12.

2 16 CU. FT—22⅝" dia. 77" high—200 lb. working pressure A.S.M.E. Std. T-13.

ENGINES

Designed especially for application to Excavating or similar Equipment. Can be used for stationary or semi-stationary service.

Diesel

2—140 H.P. NEW, NON-REVERSIBLE ATLAS DIESEL ENGINES—5 cylinder, 9" bore x 10½" stroke, 514 R.P.M., 4 cycle, vertical overhead valves, dust proof, oil tight crank case and forced lubrication. Includes auxiliary air starting equipment. DE-2.

Steam

1 12½"x16" link reversing type for Railroad Shovel. ME-1.

2 4½"x5" reversible—20.8 H.P. at 400 R.P.M. 100 lb. Pressure. ME-2.

1 4¾"x5" reversible—23.2 H.P. at 400 R.P.M. 100 lb. Pressure. ME-3.

1 5"x5" reversible—25.6 H.P. at 400 R.P.M. 100 lb. Pressure. ME-4.

BOILERS

NEW

Will Make That Old Shovel Work Like New.

Can also be used for Miscellaneous Service

Vertical Type

1 46½"x110"—32 H.P.—155 lb. Working Pressure. Special Wood Burning Fire Box. ASME Std. Will fit any B-2 or B-3. B-9.

Locomotive Type

2 44'x17'—75 H.P. 125 lb. Working Pressure. ASME Std. Will fit Model 68-C. B-13.

1—70"x12'—136 H.P. 175 lb. Working Pressure. ASME and Mass. Std. Will fit 126-B. B-18.

AIR COMPRESSORS

1 BRAND NEW WORTHINGTON—METAL-WELD—2-cylinder 7"x6" Vertical 162 cu. ft. piston displacement, Air Compressor. Fitted with Laidlaw feather valves—Lugs on side for mounting on skids or channels—Shaft extended and equipped with semi-flexible coupling to take 2⅝" drive shaft—Force feed lubrication. Automatic control. Includes 1" High capacity centrifugal circulating pump—"V" belt driven—18"x41" Air Receiver, 100 pounds working pressure, A.S.M.E. Standard. Electric or gasoline power required approximately 30 H.P., approximately 1000 R.P.M.—Compressor Speed approximately 550 R.P.M.—Overall dimensions: Height 45"—length 37½"—width 28". AC-8.

2 11"x11"x12" STEAM DRIVEN LOCOMOTIVE TYPE, Westinghouse air compressors with fittings. NEW. AC-1.

1 11"x11"x12" STEAM DRIVEN LOCOMOTIVE TYPE, Westinghouse air compressors with fittings. Used. Make offer. AC-2.

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SMALL SHOVELS
Under 2 Yards

ASSORTED DIPPER SIZES

LINK-BELT-K42, 1½-yard gas shovel; MARION-480 Electric 2-yard shovel located in Texas; MARION-31—1-yard steam shovel in Indiana; MARION-36 1-yard steam shovel in Michigan. Elwood Sales & Mfg. Co., Lafayette, Indiana.

⅜-YARD

BYERS BEARCAT JR.—⅜ CUBIC YARD GASOLINE SHOVEL. BUDA HIVELO ENGINE. Approximately one year old. Excellent condition. Favorable price. Located Minnesota. Box 791-SS.

BYERS-BEARCAT — Combination Shovel—Pull Shovel and Lifting Crane; Half swing. Gasoline power. Excellent condition. Located Detroit, Michigan. Box 690-SS.

INSLEY SKIMMER SCOOP—48" BUCKET. Bargain price. located vicinity Moretown, Vt. Box 792-SS.

INSLEY — TYPE C — GASOLINE SHOVEL. Engine recently rebored and reconditioned. Machine generally in good operating and mechanical condition. Equipped with Buda type KTU Diesel engine. Located Arkansas. Box 814-SS.

INSLEY Type C Combination Shovel and Skimmer Scoop. Buda 4-cylinder 4"x5½" Type KTU Engine. Field reconditioned. Excellent condition. Located Georgia. Box- 834-SS.

UNIVERSAL-UNIT ¾-swing combination ⅜ cu. yd. gasoline shovel and 30-foot boom dragline, including ⅜ cu. yd. dragline bucket. Working every day. Good condition. Located Grand Haven, Michigan. Box 769-SS.

UNIVERSAL—MODEL B—⅜ yard ¾ swing shovel. Powered with Ford 4-cylinder Engine. Rebuilt 1935. Good operating condition. Located near Milwaukee. Box 781-SS.

½-YARD

BROWNHOIST MODEL NO. 2 ½ cu. yd. rope crowd gasoline shovel or clamshell. Waukesha four cylinder engine in good operating condition. Bargain price. Located near Peoria, Illinois. Box 689-SS.

BUCYRUS-ERIE Type A Steam Shovel. Caterpillar mounted. Excellent condition. Box 835-SS.

THEW TYPE S electric mining crawler shovel, ½-yard bucket, 20 h.p. and 12 h.p. Otis motors. Located in Minnesota. Box 832-SS.

⅝-YARD

P&H MODEL 300 SHOVEL—18' Boom, 15' Dipper Handle, ⅝ cubic yard Dipper, manganese front. Powered with Waukesha B U 4½"x6¼" engine, power clutch control. First class operating condition. Located Massachusetts. Box 663-SS.

¾-YARD

BUCYRUS-ERIE TYPE B STEAM COMBINATION SHOVEL-CLAMSHELL AND STEAM HOE. Machine completely rebuilt 1929. Good operating condition. Located near Boston. Box 517-SS.

BUCYRUS-ERIE—TYPE B—Combination shovel and 40' boom crane. Boiler reflued and the machine in fair operating condition. Located Arkansas. Box 815-SS.

BUCYRUS-ERIE TYPE B HIGH LIFT STEAM SHOVEL. Caterpillar mounted. Good operating condition. Located New Haven, Connecticut. Box 776-SS.

BUCYRUS-ERIE TYPE B CATERPILLAR MOUNTED, HIGH LIFT STEAM SHOVEL. Good operating condition. Located Connecticut. Box 775-SS.

BUCYRUS-ERIE TYPE B STEAM SHOVEL, cat. mounted, equipped with 19'6" boom 16' dipper stick and ¾ yard dipper including 36' clamshell boom in good working order. Located near Hudson, Pennsylvania. Price $1000.00. Box 493-SS.

BUCYRUS-ERIE TYPE B STEAM SHOVEL, Cat mounted, 19'6" boom, 14' dipper handle, ¾ cubic yard dipper. also 36' clamshell boom and front drum and gearing. Located Kansas City, Missouri. Box 622-SS.

2 BUCYRUS-ERIE TYPE B CATERPILLAR MOUNTED STEAM SHOVELS. Excellent condition. Located central New York State. Box 837-SS.

BUCYRUS-ERIE 20-B COMBINATION STEAM SHOVEL - CLAMSHELL - DRAGLINE. Good working condition. Caterpillar Mounted. Located near Peoria, Illinois. Box 701-SS.

BUCYRUS-ERIE TYPE B STANDARD ¾ YARD STEAM SHOVEL—Quarry type Dipper—Caterpillar mounted. Good operating condition. Located Georgia. Box 752-SS.

TYPE B BUCYRUS-ERIE HIGH LIFT STEAM SHOVEL. 21'3" Boom, 18'4" Dipper Handle, ¾ cubic yard inserted Tooth Dipper—Power Boom Hoist—Boiler Feed Pump—Caterpillar Mounted. Located Chicago. Box 699-SS.

KOEHRING MODEL 301 COMBINATION SHOVEL & 40' BOOM DRAGLINE, caterpillar mounted Gasoline Power. Good operating condition. Located Indiana. Box 764-SS.

KOEHRING MODEL No. 1—¾ yd Shovel. Wisconsin 50 H.P. 4-cylinder 5"x6" Engine. Steel Cab. Field reconditioned. Located near Milwaukee, Wis. Box 836-SS.

MARION MODEL 21 ELECTRIC—M.G. SET ¾ YARD SHOVEL. Good condition. Located eastern Pennsylvania. Box 725-SS.

NORTHWEST MODEL 3 GASOLINE CABLE CROWD—FEATHER TOUCH CONTROL—SHOVEL. Good operating condition. Located Chicago. Box 798-SS.

OSGOOD MODEL 18 Steam—¾ yard shovel—Cat mounted. Just completely overhauled. Excellent condition. Located near Indianapolis, Ind. Box 522-SS.

⅞-YARD

BUCYRUS-ERIE HIGH LIFT STEAM SHOVEL. B-2—⅞ CUBIC YARD DIPPER. Favorable price. Located vicinity Boston. Box 793-SS.

MARION MODEL 21 — ⅞ CUBIC YARD STEAM SHOVEL. Caterpillar Mounted. Good working condition. Located Georgia. Box 758-SS.

1-YARD

BUCYRUS-ERIE LATE MODEL B-2 STEAM HIGH LIFT SHOVEL. 1 yard dipper—single shaft cat mounting. Good condition. Located near St. Louis. Box 518-SS.

BUCYRUS-ERIE GA-2 GAS-AIR COMBINATION ONE YARD SHOVEL AND 45' BOOM CLAMSHELL AND DRAGLINE not including Buckets Recently reconditioned. Located Indianapolis. Box 766-SS.

BUCYRUS-ERIE—GA-2 GAS-AIR SHOVEL. Extra High Lift. Caterpillar mounted. Good operating condition Waukesha 5¾"x8" four cylinder gasoline Engine. Air Starter. Located Chicago. Box 764-SS.

BUCYRUS-ERIE GA-2 Gas-Air High Lift Shovel. 24' Boom, 18'4" Dipper Handle, 1 cubic yard Dipper. Single shaft cat. Waukesha four cylinder gasoline engine. Excellent operating condition. Located Milwaukee. Box 645-SS.

BUCYRUS-ERIE B-2 HIGH LIFT STEAM SHOVEL. 19'9" Boom, 16' Dipper Handle, ⅞ cubic yard inserted tooth Dipper. Two speed propelling gear. Located Boston. Box 716-SS.

BUCYRUS-ERIE B-2 HIGH LIFT STEAM SHOVEL. Boiler A-1 shape. Main machinery overhauled last year. Practically new boom with engine. Located near Duluth, Minnesota. Box 794-SS.

BUCYRUS-ERIE GAS-AIR HIGH LIFT SHOVEL & CLAMSHELL—24' Shovel boom, 20'6" Dipper handle, 1 cubic yard dipper and 45' boom clamshell equipment not including bucket. Will sell as shovel or combination machine. Excellent condition. Located eastern Pennsylvania. Box 839-SS.

BUCYRUS-ERIE B-2 HIGH LIFT STEAM SHOVEL. Caterpillar mounted. Good operating condition. Located Boston. Box 838-SS.

BUCYRUS-ERIE GA-2 1-yard dipper. Mounted on caterpillars. Located in Minnesota. ..... Box 931-SS.

BUCYRUS-ERIE 30-B STEAM SHOVEL. Located St. Louis, Missouri. Box 817-SS.

31-B BUCYRUS-ERIE STEAM SHOVEL. 1-yd. dipper. For sale at $2,000 cash. $500 will put this machine in first class working condition. Shop No. 4853. Located western Tennessee. Box 822-SS.

FOR SALE

Address all box numbers c/o Excavating Engineer at South Milwaukee, Wisconsin

1¼-YARD

BUCYRUS-ERIE — DIESEL-AIR — COMBINATION SHOVEL AND DRAGLINE. 22'6" Boom—16' Dipper Handle—1¼ cubic yard Inserted Tooth Dipper. 45' Boom Complete Dragline Equipment without bucket. Engine—Atlas Diesel. Located Oklahoma. Good operating condition. Box 703-SS.

BUCYRUS-ERIE GAS-AIR TYPE GA-2 HIGH LIFT SHOVEL — 22'6" boom — 16' dipper handle—1¼ yard cast front inserted tooth dipper—single shaft caterpillar mounting—electric starter. Excellent condition. Field reconditioned. Waukesha 4-cylinder 6¼"x8" engine — New cylinder blocks and piston rings. Located near Scranton, Pennsylvania. Will demonstrate. Box 508-SS.

BUCYRUS-ERIE GAS+AIR—22' Boom, 16' Dipper Handle, 1¼ cubic yard Dipper, Waukesha 6¼"x8" four cylinder gasoline engine. Single Shaft Cat mounted. First class condition. Located eastern New York. Box 601-SS.

BUCYRUS-ERIE 37-B Gasoline Shovel. 23' Boom 17' Dipper handle. 1¼ cubic yard dipper. Chain Crowd. Wisconsin D-3 6-cylinder 5½"x6½" Engine. Reconditioned. Excellent condition. Located Vicinity of New York. Box 840-SS.

LIMA 101 GASOLINE SHOVEL with 1¼ yard bucket. Waukesha motor. In good operating condition. Located in Ohio. Box 808-SS.

LIMA MODEL 101—Combination 1¼ yard shovel and 40' plus 10' extension Dragline—powered with gasoline engine Model JK 6½" x7"—4 cylinder. Shovel equipment practically new. Located Colorado. Box 599-SS.

LINK-BELT MODEL K-42 1¼ YARD GASOLINE SHOVEL. Waukesha Model WL 6¼"x 8" 4-cylinder Engine—new blocks and pistons this year. Good working condition. Located Colorado. Box 738-SS.

LORAIN—75-A—One and one-quarter cubic yard Gasoline Shovel. Good condition. Located Chicago. Box 676-SS.

LORAIN MODEL 75—1¼ YD. SHOVEL. 21'0" boom, 14' dipper handle. Also 45' plus 15', total 60', dragline boom and equipment, and 1¼ cu. yd. Page "M" dragbucket. Engine—Waukesha WL 6-cylinder 6¼"x8" gasoline. Located—Denver, Colorado Box 806-SS.

MARION TYPE 32 STEAMER. Shop No. 5676, 18' boom, 15' dipper handle, 1¼-cu. yd. dipper shipped May, 1926, good operating condition. Box 451-SS.

BUCYRUS-ERIE MODEL B-2 High Lift Steam Shovel. Caterpillar mounted. Very good working condition. Located South Carolina. Box 644-SS.

BUCYRUS-ERIE GA-2 COMBINATION SHOVEL AND DRAGLINE. 22'6" Shovel Boom, 16' Dipper Handle, 1 cubic yard cast front inserted tooth Dipper. 50' Dragline Boom including Fair leads but not Bucket. Air Starter. Good condition. Located Newark. Box 718-SS.

BUCYRUS-ERIE GA-2 HIGH LIFT SHOVEL. 24' Boom—18'4" Dipper Handle, 1 cubic yard Inserted Tooth Dipper. Also includes Forward Drum and Gearing and mechanism for clamshell operation including 45' boom. Also 1 cubic yard Williams clamshell bucket. Waukesha WL Engine. Good operating condition. Located Chicago. Box 702-SS.

BUCYRUS-ERIE MODEL B-2 High Lift Steam Shovel. Caterpillar mounted. Good working condition. Located northern New Jersey. Price very reasonable. Box 643-SS.

BUCYRUS-ERIE GA-2—Gas-Air Combination High Lift Shovel and 50' Boom Dragline Equipment, mounted on Single Shaft Cat. Good operating condition. Located at Fort Smith, Ark. Box 537-SS.

B-2 EXTRA HIGH LIFT STEAM SHOVEL. 24' Boom—18'4" Dipper Handle—¾ yard Inserted Tooth Dipper—Boom Hoist—Caterpillar Mounted—Good operating condition. Located Chicago. Box 700-SS.

LORAIN—MODEL 60—One cubic yard Gasoline Shovel. Good condition. Located Chicago. Box 677-SS.

MARION 1 CUBIC YARD STEAM SHOVEL. Bargain Price. Box 777-SS.

P & H MODEL 600—1 yd. Gasoline Shovel—including 40' boom dragline equipment without bucket. Waukesha Engine. Recently overhauled. Located in Alabama. Box 483-SS.

P&H MODEL 600—1¼ CUBIC YARD GASOLINE SHOVEL. Will be put in good operating condition. Located eastern Pennsylvania. Box 664-SS.

P&H—MODEL 600—Combination 1 yard shovel and 40' boom dragline including dragline bucket. Waukesha gasoline engine. Machine in fair operating condition. Located Georgia. Box 695-SS.

1½-YARD

BUCYRUS-ERIE 43-B GASOLINE CHAIN CROWD SHOVEL — 23' boom — 17' dipper handle—1½ cubic yard Vanderhoef dipper and teeth—electric starter—standard single shaft cat. Operated less than six months. Excellent appearance and condition. Will be demonstrated by owner. Located vicinity New York. No. 512-SS.

TWO LORAIN 75-B COMBINATION 1½ CUBIC YARD SHOVEL AND 50' BOOM DRAGLINES — without buckets. Gasoline power. Good working condition. Located eastern Pennsylvania. Box 721-SS.

LORAIN 75-B—1½ cubic yard Shovel and 50' Boom Dragline. Will sell as Shovel or combination machine. Good operating condition. Located eastern Pennsylvania. Box 722-SS.

MARION MODEL 32 CATERPILLAR MOUNTED STEAM SHOVEL—1½ cu. yd. dipper. Also clamshell and dragline equipment available without bucket. Boiler recently re-flued. Machine in A-1 condition. Priced right for quick sale. Located near Chicago. Box 803-SS.

OSGOOD "VICTOR" 1½ CUBIC YARD SHOVEL AND 50' BOOM CLAMSHELL MACHINE. Gasoline Power. Good operating condition. Located Wisconsin. Box 760-SS.

P & H MODEL 700—1½ CU. YD. GASOLINE SHOVEL. Engine: Waukesha 4-cyl. 7½"x8" Engine. Fair working condition. Located New Mexico. Bargain price. Box 789-SS.

1¾-YARD

BUCYRUS-ERIE—50-B—DIESEL SHOVEL. 38' Boom, Two 19' Dipper Handles. 1¾ Cubic Yard Rock Bucket and 1¾ Cubic Yard Dirt Bucket. 60' Boom Dragline Equipment without bucket included. Shovel only located Montana. Dragline equipment located Minnesota. Box 785-SS.

BUCYRUS-ERIE 50-B, 1¾ yard steam shovel, steel cab, may be inspected. Located Minnesota. Box 827-SS.

5—MARION MODEL 37, 1¾ yard steam shovels, steel cab. Good working condition. Located Minnesota. Box 825-SS.

2-YARD

BUCYRUS-ERIE 50-B STEAM SHOVEL Equipped with air compressor and Moon Turbo lighting system. Boom 30'. Dipper handle 19'. Dipper 2 cu. yd. Coal Loading type. Minor repairs needed otherwise excellent condition. Located Eastern Ohio. Box 818-SS.

BUCYRUS-ERIE 50-B — STEAM SHOVEL. 26' boom. 17' dipper handle. 2 cu. yd. dipper. 1½ KW Moon Lighting Plant. Excellent condition. Located St. Louis, Missouri. Box 819-SS.

BUCYRUS-ERIE 43-B DIESEL SHOVEL. 22'6" boom, 16' dipper handle. 2 cubic yard Amsco dipper. Buda 6-cylinder 6¼" Diesel Engine. Kohler 1½ KW Light plant. Machine excellent condition. Ready to go to work. Located on Southern Pacific Railroad in Nevada. Box 841-SS.

BUCYRUS-ERIE 50-B STEAM COMBINATION SHOVEL-DRAGLINE. 26' boom, 17' dipper handle, 2 cubic yard dipper. 60' boom dragline equipment including 2 cubic yard Page Class M bucket and steam operated lighting plant. Machine can be placed in operation quickly with installation few small parts. Very attractive price. Located Alabama. Box 842-SS.

SMALL DRAGLINES
Under 2 Yards

⅜-YARD

TWO ⅜-YARD SARGENT SCOUT DRAGLINES. Powered with McCormick-Deering Model 200 4-cylinder 4¼x5 heavy duty gas engines. Cable speed 160 fpm, single line. Two traveling speeds. Capacity as crane from 8000 lbs. at 8 ft. radius to 2800 lbs. at 24 ft. radius. First class mechanical condition. Located Iowa and Minnesota. Box 772-SD.

UNIVERSAL-UNIT ¾ swing combination 80-foot boom gasoline dragline and ⅜ cu. yd. shovel. ⅜ cu. yd. dragline bucket. Working every day. Good condition. Located Grand Haven, Michigan. Box 769-SD.

¾-YARD

BUCYRUS-ERIE 20-B COMBINATION STEAM DRAGLINE - CLAMSHELL - SHOVEL. Good working condition. Caterpillar Mounted. Located near Peoria, Illinois. Box 701-SD.

KOEHRING MODEL 301 COMBINATION 40' BOOM DRAGLINE & SHOVEL, caterpillar mounted. Gasoline Power. Good operating condition. Located Indiana. Box 764-SD.

1-YARD

BUCYRUS-ERIE GA-2 COMBINATION DRAGLINE AND SHOVEL. 50' Dragline Boom including Fairlead but not Bucket. 22'6" Shovel Boom, 16' Dipper Handle, 1 cubic yard cast front inserted tooth Dipper. Air Starter. Good condition. Located Newark. Box 718-SD.

BUCYRUS-ERIE GA-2 GAS-AIR COMBINATION 45' BOOM DRAGLINE AND CLAMSHELL AND ONE YARD SHOVEL. Buckets not included. Recently reconditioned. Located Indianapolis. Box 766-SD.

FOR SALE

Address all box numbers c/o Excavating Engineer at South Milwaukee, Wisconsin

SMALL DRAGLINES
Under 2 Yards
continued

LINK-BELT 1 CUBIC YARD CAPACITY 50' BOOM DRAGLINE WITHOUT BUCKET. Gasoline power. Reported good operating condition. Located near Chicago. Box 724-SD.

P&H—MODEL 600—Combination 40' boom dragline and 1 yard shovel including dragline bucket. Waukesha gasoline engine. Machine in fair operating condition. Located Georgia. Box 695-SD.

1¼-YARD

BUCYRUS-ERIE — DIESEL-AIR — COMBINATION DRAGLINE AND SHOVEL. 22'6" Boom—16' Dipper Handle—1¼ cubic yard Inserted Tooth Dipper. 45' Boom—Complete Dragline Equipment without bucket. Engine—Atlas Diesel. Located Oklahoma. Good operating condition. Box 703-SD.

1½-YARD

LINK-BELT MODEL K-44 45' BOOM PLUS TWO 10' AND ONE 5' EXTENSIONS—TOTAL 70' DRAGLINE WITHOUT BUCKET. Gasoline power. Includes 800 Watt Kohler Light Plant. Located near Chicago. Good operating condition. Box 723-SD.

2 LORAIN 75-B COMBINATION DRAGLINES AND SHOVELS. 50' dragline booms without buckets. 1½ cubic yard shovel equipment. Gasoline power. Good working condition. Located eastern Pennsylvania. Box 721-SD.

TWO P&H 700 DRAGLINES. 1½ cu. yd. buckets on 50' booms. Gas and Diesel. Located Lower Rio Grande Valley, Texas. Box 618-SD.

SMALL CLAMSHELLS AND CRANES
Under 2 Yards

⅜-YARD

BAY CITY "PUP" CLAMSHELL MACHINE. Good operating condition. Box 514-SCC.

½-YARD

BYERS BEARCAT CLAMSHELL—Crane—30' boom. Will handle ½ cubic yard bucket. Located near Grand Rapids, Mich. Box 648-SCC.

GENERAL—GASOLINE—35' BOOM CLAMSHELL. Now operating near St. Joseph, Illinois. Box 782-SCC.

ORTON 24' BOOM—½ CUBIC YARD CLAMSHELL MACHINE. ½ cubic yard Owen Clamshell Bucket. Hercules 55 HP. Gasoline Engine. Factory rebuilt 1932. Good operating condition. Located Tennessee. Box 709-SCC.

¾-YARD

BUCYRUS-ERIE 20-B COMBINATION STEAM CLAMSHELL - DRAGLINE - SHOVEL. Good working condition. Caterpillar Mounted. Located near Peoria, Illinois. Box 701-SCC.

O & S MODEL "T" ¾ yard clamshell machine. 40' boom. Good working condition. Powered with Climax 5½"x7" gasoline engine. Located near St. Louis. Good working condition. Box 651-SCC.

1-YARD

BUCYRUS-ERIE GA-2 45' BOOM CLAMSHELL MACHINE. Single Shaft Cat. Waukesha 5¾"x8" four cylinder gasoline engine. Good operating condition. Located St. Paul, Minnesota. Box 761-SCC.

BUCYRUS-ERIE GA-2 GAS-AIR COMBINATION 45' BOOM CLAMSHELL AND DRAGLINE AND ONE YARD SHOVEL. Buckets not included. Recently reconditioned. Located Indianapolis. Box 766-SCC.

BUCYRUS-ERIE - GA-2—45' BOOM CRANE. Waukesha gas engine. First class operating condition. Located Tennessee. Box 816-SCC.

1¼-YARD

P&H MODEL 700—50' BOOM CLAMSHELL MACHINE INCLUDING 1¼ CUBIC YARD OWEN CLAMSHELL BUCKET. Waukesha 6¼"x8" four cylinder gasoline Engine. Excellent condition. Located Chicago. Box 762-SCC.

NORTHWEST MODEL 105 Gasoline—40' boom clamshell. Good operating condition. Located Iowa. Box 516-SCC.

1½-YARD

OSGOOD "VICTOR" 50' BOOM CLAMSHELL MACHINE AND 1½ CUBIC YARD SHOVEL. Gasoline Power. Good operating condition. Located Wisconsin. Box 760-SCC.

If You Do Not Find What You Want Listed—Write Us

Excavating Engineer
South Milwaukee, Wisconsin

LARGE SHOVELS AND DRAGLINES
2 Yards and Over

1½-W MONIGHAN WALKER. Diesel power. 2 yard capacity. 60-foot boom Good condition Reasonably priced. Located Kansas. Box 742-LSD.

2-W MONIGHAN WALKER 2½ yard capacity. 70-foot boom. Good condition. Reasonably priced. Located Kansas. Box 743-LSD.

CLASS 230 STEAM DRAGLINE. 175-foot steel and aluminum boom. 6-yard RED ARCH bucket. Ready to work. Located near New Roads. Louisiana. Box 751-LSD.

TYPE 175-B ELECTRIC, No. 794 equipped with 87' shovel boom, 48' dipper handle. 3½-yd. bucket, and dragline equipment including 125' boom, and 3½-yd. bucket. This machine was recently reconditioned and is in good operating condition. Present, location, Connecticut. Box 263-LSD.

100-B STEAM SHOVEL, 3 yd. dipper, location Eastern Canada. Immediately available. Used—good condition. Box 669-LSD.

REQUIRING OTHER EQUIPMENT I have a 100-B, 3-yd., electric shovel for sale. Write Box 812-LSD.

100-C BUCYRUS STEAM SHOVEL on trucks, 3½-yard dipper. New 1914. Willing to sell very cheap. Located near Allentown, Pa. Box 807-LSD.

50-B STEAM SHOVEL, Number 3946; equipped with 1½-cubic-yard dipper, 26-foot boom, also 1½-cubic-yard dragline bucket with 50-foot boom caterpillar mounted, equipped for burning oil, located at Texarkana, Ark. Price $3,000. Box 112-LSD.

PAGE DRAGLINE, track mounted, 90-foot boom, 3½-yard Page RC bucket with new 150 h.p. Venn-Severin Diesel engine. Thoroughly overhauled and rebuilt in 1935. Now working in Indiana. Box 768-LSD.

ANY FAIR OFFER ACCEPTED

Class 24 steam dragline. 100 foot boom, 5 cubic yard bucket. Skid and roller mounted. Rebuilt 1927 at a cost of $16,000. New locomotive boiler installed 1928. Will accept any fair offer. Located near Fort Worth, Texas. Box 823-LSD.

FOR SALE OR RENT

TWO CLASS 14 STEAM DRAGLINES, 70-foot booms and 2-yd. buckets. Caterpillar mounted. Equipped for burning gas or oil. Located in southwest. Price at approximately $4,000 each. Box 821-LSD.

CLASS 320 STEAM DRAGLINE. 144-foot boom. 8-yard bucket. Located on Illinois River. A good buy. Box 750-LSD.

CLASS 14 DIESEL-ELECTRIC DRAGLINE. 70-foot boom. 2-yard bucket. Immediately available. Located near St. Louis. Box 749-LSD.

70-C BUCYRUS STEAM SHOVEL on Cats. Complete. In operating condition. Shop number 1712. Also one extra three-yard Manganese dipper and sticks. Chicago territory. Box 847-LSD.

MARION 480 2-YARD STEAM SHOVEL, good working condition. Substantial saving. Located in Minnesota. Box 826-LSD.

BUCYRUS-MONIGHAN 3-W walking dragline. 85' boom, 2½-yard bucket. Located Stovall, Miss. Box 843- LSD.

BUCYRUS-ERIE 70-C, 2½ yard steam shovel, railroad type. Located in Minnesota. Box 829-LSD.

P&H MODEL 900, 3½ yard Diesel Shovel. 33-foot boom, 200 h.p. Fairbanks-Morse engine. Mounted on caterpillars. Box 828-LSD.

CLASS 14 DIESEL ELECTRIC DRAGLINE for sale. 70' boom. Can be seen working during next 30 days. Good price. Southern location. Box 846-LSD.

FOR SALE

Address all box numbers c/o Excavating Engineer at South Milwaukee, Wisconsin

BUCYRUS-MONIGHAN 4-W Walking dragline, 80' boom 5½-yard Page bucket, 30' boom insert and 4-yard bucket. Located Tennessee. Box 844-LSD.

3—MARION 92-M, 4-YARD RAILROAD TYPE steam shovels located near Hibbing, Minnesota. Box 830-LSD.

BUCYRUS-ERIE 50-B Steam shovel, located Montana. Attractive price. Box 845-LSD.

48-C BUCYRUS ELECTRICALLY OPERATED SHOVEL, equipped with 2½-yard manganese front dipper, 3 phase, 60-cycle, 440-volt motors, transformers, cable, reel and approximately 1400 feet of cable all in excellent condition. Reasonable price.
Address Box 268-LSD.

3-W MONIGHAN DIESEL DRAGLINE. 85-foot boom. Electric Swing. 2 buckets—2½ and 3½ cu. yd. capacities. Located Evansville, Indiana. Might be loaded on barge.
Box 787-LSD.

MONIGHAN DRAGLINE MODEL T, 2-cubic-yard 60-foot boom located near Wichita, Kansas. About seven years old. Has recently been thoroughly overhauled. Box 180-LSD.

MONIGHAN STEAM DRAGLINE, two cubic yards capacity. 60' boom. Horizontal locomotive-type boiler. 2½-yard Page bucket. In good operating condition; overhauled in 1931 and not used. Located Iowa. Box 770-LSD.

CLASS 14 STEAM DRAGLINE, 60' boom. 2 cubic yard Page bucket. Locomotive-type boiler. Thoroughly overhauled and ready for service. Located Iowa. Box 771-LSD.

TWO 3-W MONIGHAN WALKERS. 3½ yards. 70- and 77-foot booms. Good condition. Reasonably priced. Located Louisiana.
Box 745-LSD.

BUCYRUS 320-B STEAM STRIPPING SHOVEL, shop number 4205, new in 1925, used less than four years. Located at Toronto, Ohio. Box 74-LSD.

2-W MONIGHAN WALKER. 2½ yard capacity. 70-foot boom. Good condition. Priced reasonably. Located Louisiana. Box 744-LSD.

FOR SALE

USED 4-YD. 120-B ELECTRIC QUARRY SHOVEL. Reasonably priced. Can be inspected. Box 820-LSD.

LOCOMOTIVE CRANES

TWO AMERICAN STEAM LOCOMOTIVE CRANES. Each 8 wheel—25 ton capacity. Each equipped with 8¼"x10" double cylinder engine. Boom 50'. Steam brakes and train air line. Boiler 54"x101" ASME—130 pounds pressure. Standard gauge 4'x8½". Used only eight months. Splendid condition. Box 628-ME.

LOCOMOTIVES

LOCOMOTIVES

2 BALDWIN, 17x24, straight drive standard gauge 45 ton locomotives. 54 inch boilers. Shop numbers 33962 and 33266. Each one has passed State Boiler Inspection yearly. Boilers will stand cold water test of 240 lbs. At present in actual service in Minnesota mine. Box 152-ME.

MISCELLANEOUS EQUIPMENT

MINING AND QUARRY EQUIPMENT

The following equipment is located in Minnesota. Full details on request.

5—Boilers
12—36" gauge Koppel double truck flat cars.
6—36" gauge Peteler 4-yard two way dump cars.
3—Crushers.
4—Swing & Boom engines for Marion 31 & 36 shovels.
1—Austin-Western grader, 8' blade & scarifier.
4—Hoists—Single and double drum.
3—Milwaukee gasoline locomotives, 7-ton 24" gauge.
2—Whitcomb gasoline locomotives, 7-ton, 24" gauge.
4—Electric motors, 100 to 150 h.p.
9—Pumps—Steam and gasoline.
5—Redwood tanks.
1—Special Twin City Tractor.
1—Complete Ainley Placer gold machine.
Box 833-ME.

DRAG SHOVEL ATTACHMENT A BARGAIN

BRAND NEW PAGE DRAG SHOVEL EQUIPMENT suitable for application to Bucyrus-Erie 1030, 1035, or 32-B machines now in the field, consisting of 17'1½" boom, 11' dipper handle, and two ¾ cubic yard dippers; one 38" wide over cutters—the other 49½" wide over cutters together with auxiliary A frame and ropes. Priced below cost. Box 683-ME.

4—75 DIESEL CATERPILLAR TRACTORS.
4—EUCLID DUMP WAGONS. Located eastern Pennsylvania. Box 710-ME.

PARTS—175-B Shovel—PARTS

1 Main Engine
1 Boom
1 Dipper Shaft
1 Crowding Engine
1 Five Yard Dipper

If interested in making a good buy on these shovel parts, write us.
Box 607-ME.

SHOVEL FRONT ENDS

ONE COMPLETE 52-B DIESEL SHOVEL FRONT END. Consists of boom, dipper handle and 2¼ cu. yd. dipper.
TWO COMPLETE 52-B ELECTRIC SHOVEL FRONT ENDS. Consist of Booms, dipper handles and 2¼ cu. yd. dippers. Motors on booms are 3-phase, 60 cycle, 2300 volt current.
Box 741-ME.

4 LA PLANT CHOATE 6-yard, all-steel, dump wagons. Equipped with wide iron wheels. Price $300. for lot. Chicago territory. Box 349-ME.

REBUILT LOADMASTER

Model "MD" Loadmaster with McCormick-Deering Model 20 tractor, 14' boom, solid rubber tires, can be had at exceptional saving. For further particular write Tractor & Equipment Company, 433 South Jefferson St., Chicago, Illinois.

WELDING AND CUTTING OUTFITS

Complete Welding Outfits, $44.82. Combination Welding and Cutting Outfit, $59.81. Heavy Duty Cutting Outfit, $49.62. The Superior Oxy-Acetylene Company, Hamilton, Ohio.

ONE (1) PARSONS No. 40 TRENCHING MACHINE, 18' ladder with buckets for from 18 to 42" trench. In good mechanical condition. Located in St. Louis, Missouri. Price $5000.00 F.O.B. cars.
Box 740-ME.

NO. 44 BARBER-GREENE DITCHER in good condition. Located near Polo, Illinois.
Box 824-ME.

Pile Driving Leaders

One (1) set of pile driving leaders, 30' long, iron bound, in excellent condition, suitable for use with 2000 lb. drop hammer, located in St. Louis, Missouri. Price—$35.00. Box 788-ME.

COMPLETE EQUIPMENT for 2 strip mines, contractors or quarry operations, No. 300 and No. 36 Marion steam shovels, well drills, locomotives, cars, crushers, picking tables, loading booms, cable and button retarders, compressors, motors, transformers, flood and search lights, camp equipment and new repair parts for above. Box 195-ME.

DIPPERS—2½ CU. YD.

2—2½ cubic yard dippers for 70C Bucyrus steam shovel. One of these dippers is in good condition and the other has not been used since being rebuilt. Has set new Westico teeth. For particulars write Foley Brothers, Inc., New York Building, St. Paul, Minn.

COMPLETE CONTRACTORS EQUIPMENT

Offered for sale by Southern contractor. Priced to sell.

7—Railroad Type Steam Shovels 2½ to 5 yd.
3—Full Revolving Shovels, ¾ yd.
1—Gasoline Clamshell Crane ½ yd.
2—Jordan Spreaders.
2—Locomotives, 26 Ton, American Saddle Tank.
32—12-yd. Western Heavy Duty Dump Cars.
1—Flat Car.
3—Camp Cars.
2—1-bag Gasoline Concrete Mixers.
Pumps, Boilers, Jacks and Other Tools.
For further particulars, Address
Box 138-ME.

A BARGAIN
IN
MISCELLANEOUS EQUIPMENT

There is left only the following of a dirt moving outfit located near Fort Wayne, Indiana.

Select what you can use and MAKE AN OFFER.

1 Fairbanks Morse Gasoline engine and 5x5 bulldozer pump 3 HP.
2 Fairbanks Morse gasoline engine and 3x5 bulldozer pump 1½ HP.
4 Track jacks, 15 ton.
3 Track jacks, light.
20 WESTERN 2-WAY 5-YARD DUMP CARS, 3 FT. GAGE.
1 Duplex Pump—Worthington. 5¼x3½x5.
10 Slips.
1 Anvil.
1 Forge
1 Carbide light.
2 Galvanized water tanks, wagon size.

BOX 811-ME.

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BUCYRUS-ERIE COMPANY

Headquarters: SOUTH MILWAUKEE, WISCONSIN, U. S. A.
Works: South Milwaukee, Wis., Erie, Pa., Evansville, Ind.

ALABAMA, BIRMINGHAM: Bucyrus-Erie Company, 2212 Comer Building. Phone 3-0642.
ARIZONA, PHOENIX: Arizona Tractor & Equipment Co., 19 West Jefferson St.
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CALIFORNIA, LOS ANGELES: Crook Company, 2900 Santa Fe Avenue, Phone Kimball 5137.
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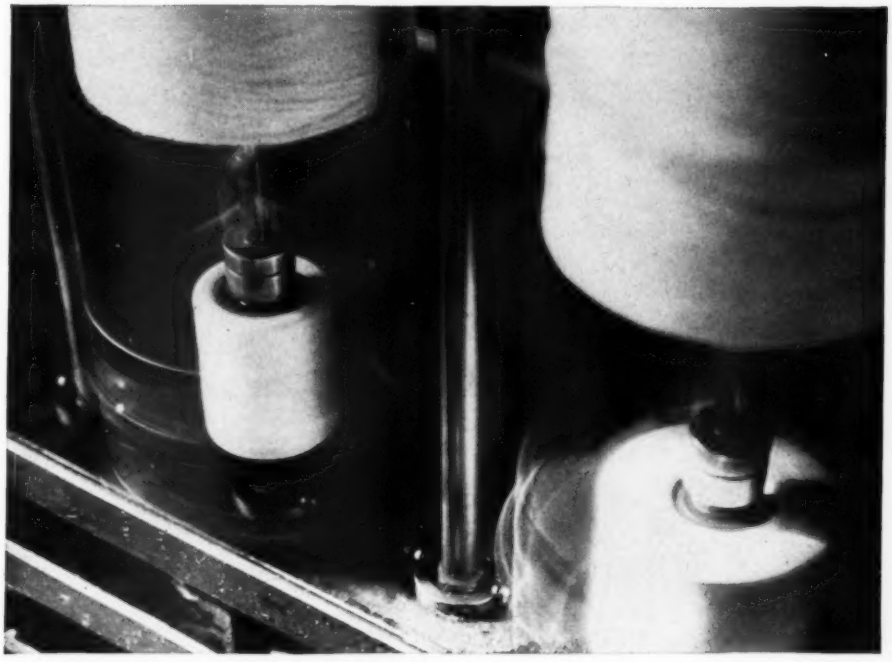

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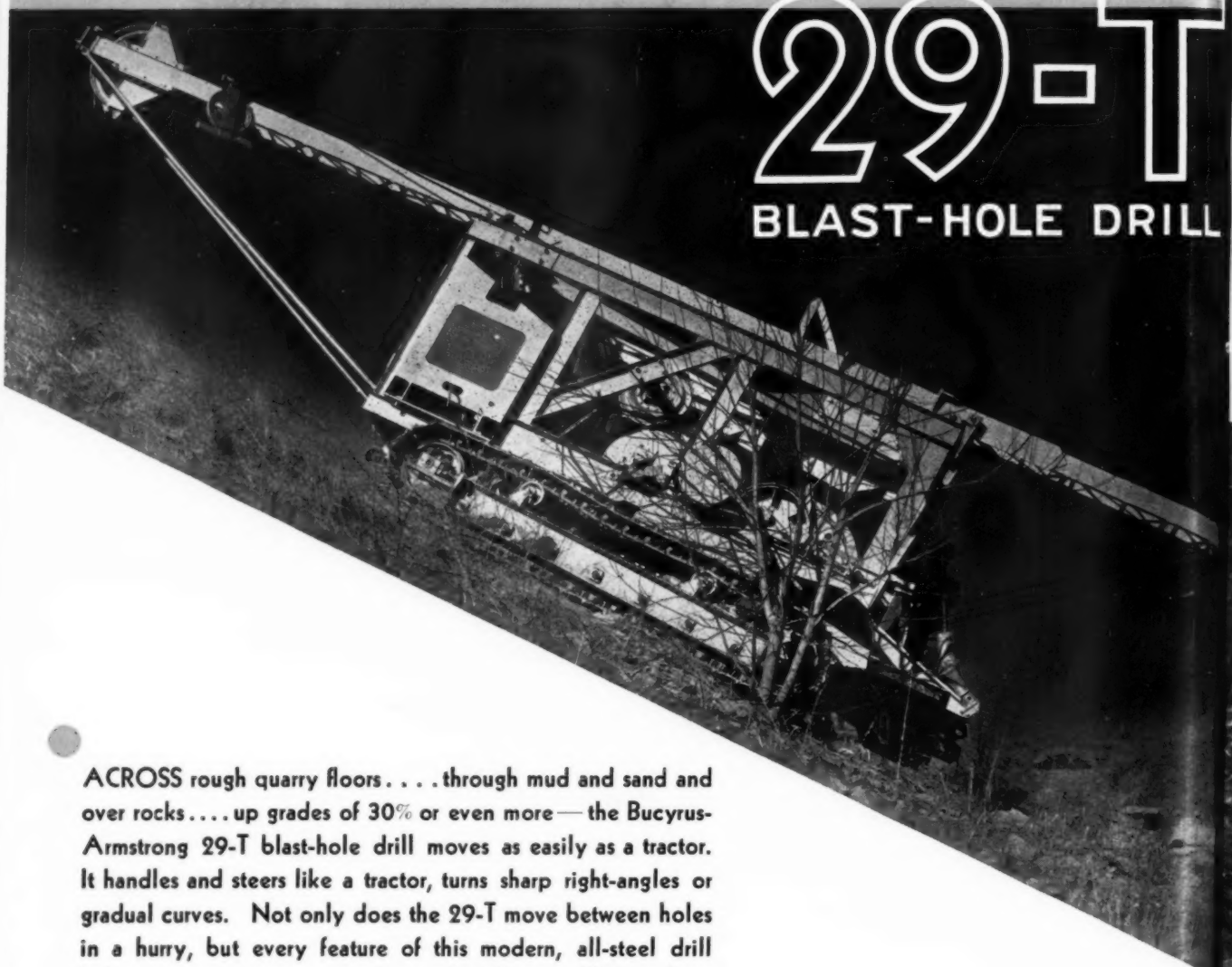

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